

PRELIMINARY

IRV300 Series

300W 10:1 Ultra Wide Input Chassis-Mount Isolated DC-DC Converter

FEATURES

- 16.8V 160V steady state, with transient range of 14.4V – 168V for 100mS
- Output voltages of 12, 24 or 54 Volts
- Up to 300 Watts total output power
- Ruggedized and encased chassis-mount package 7.3" x 4.6" x 1.6" (185mm x 116mm x 40mm)
- Compliant to Railway standards EN 50155 and EN 50121-3-2
- High efficiency up to 92%, typical
- Tight Line and Load regulation
- Low Ripple and Noise
- Extensive self-protection shut down features, including over temperature shutdown
- Output voltage adjustable
- Green LED Power Indicator
- Remote On/Off and PUL
- Optional ORing feature for redundant or parallel operation with droop
- Optional Hold-up feature
- Operating ambient temperature range -40 to +70°C (10min +85°C)

Output Voltage (Vdc)	Output Current (A)	Input Voltage Range (Vdc)
12	25.0	16.8 to 160
24	12.5	16.8 to 160
54	5.5	16.8 to 160

Optimized for harsh environments in industrial/railway applications, the IRV300 DC-DC converter series offer regulated outputs in a ruggedized, encased chassis-mount package.

PRODUCT OVERVIEW

The IRV300 series is a 300W stand alone, system level, chassis mount isolated DC-DC converter. The converter features an ultra wide input designed to accept nominal battery voltages from 24V to 110V in a single product.

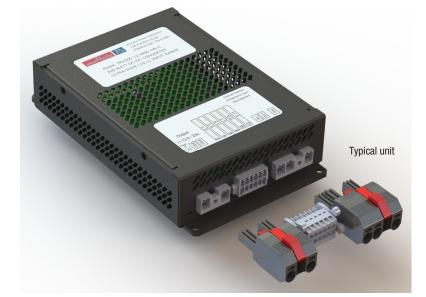
The IRV300 is ideally suited for Railway applications, meeting EN50155 standard in a single package. The output voltage has a wide trim range up to +15% of Vnom, and features a constant current output profile ideally suited for high inductive/capacitive loading.

They feature Programmable Undervoltage Lockout (PUL) to prevent deep discharge of the input batteries, Remote On/Off control and an Open Collector DC Output Power Good Signal including a visual LED as standard.

The IRV300 offer additional options such as "Hold Up" capability for overriding load dependent input interruptions of 10mS to 20mS not affecting the output and "ORing FET" for dual redundancy or power share incorporating droop voltage. The standard self protection features include Overvoltage protection, Current limit/Short circuit protection, Over temperature protection and ensure safe and reliable power delivery.

SAFETY FEATURES

- Protected against fire and smoke to EN 45545 (Pending)
- 4250Vdc input to output isolation
- UL 62368-1 and IEC/EN62368-1 safety approvals
- CE approved
- RoHS compliant





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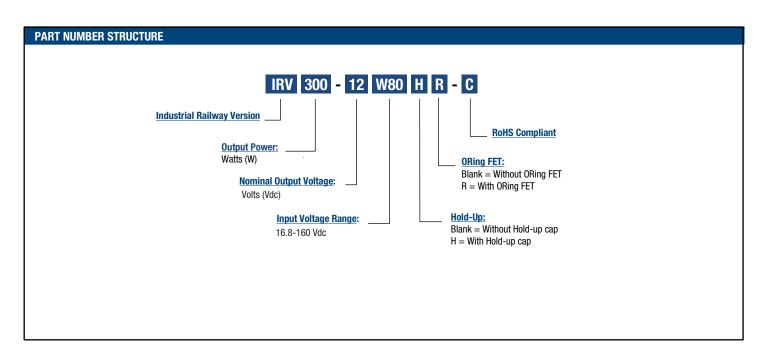
PERFORMANCE SI	PERFORMANCE SPECIFICATIONS SUMMARY AND ORDERING GUIDE ©©													
	Output				Input			Effici	0001	Destana o				
Root Model	Vout	lout	Power	R/N (mV	/ pk-pk)	Regulation	(max.) 3	Vin Nom.	Range	lin, no load	lin, full	EIIICI	ency	Package ④
	(V)	(A)	(W)	Тур.	Max.	Line	Load	(V)	(V)	(mA)	load (A)	Min.	Тур.	Case (inches)
IRV300-12W80	12	25	300	60	120	±0.5%	±0.5%	110	16.8-160	23	3	88.5%	92%	7.27 x 4.57 x 1.56
IRV300-24W80	24	12.5	300	190	240	±0.5%	±0.5%	110	16.8-160	19	3	86.0%	92%	7.27 x 4.57 x 1.56
IRV300-54W80	54	5.5	300	200	480	±0.5%	±0.5%	110	16.8-160	TBD	TBD	86.0%	90%	7.27 x 4.57 x 1.56

① Please refer to the Part Number Structure when ordering.

 \odot All specifications are at 110V nominal line voltage, full load, +25°C unless otherwise noted. See detailed specifications.

③ Regulation specifications describe output voltage deviations from a nominal/midpoint value to either extreme (50% load step).

④ Please see the Mechanical Specifications for details.



Part Number Examples:

IRV300-12W80-C stands for Industrial Railway Version, 300W, 12Vout, 16.8-160Vin, including all standard features without options, RoHS Compliant.

IRV300-12W80H-C stands for Industrial Railway Version, 300W, 12Vout, 16.8-160Vin, Hold-up, RoHS Compliant.

IRV300-24W80R-C stands for Industrial Railway Version, 300W, 24Vout, 16.8-160Vin, ORing FET, RoHS Compliant.

IRV300-54W80HR-C stands for Industrial Railway Version, 300W, 54Vout, 16.8-160Vin, Hold-up, ORing FET, RoHS Compliant.

IRV300-MCK stands for Mating Connector Kit, (NOTE: The kit contains all 3 mating connectors. There is a Minimum Pack Quantity of 4 sets.)

muRata P. Murata Power Solutions PRELIMINARY IRV300 Series

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ABSOLUTE MAXIMUM RATINGS	Conditions [1]	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous	Full temperature range	16.8		160	Vdc
Voltage Brownout and Transients	14.4V (100mS, per EN50155) / 168V (100mS)	14.4		168	Vdc
Output Power		0		303	W
Output Current	Current-limited, no damage, short-circuit protected	0		31	A
Storage Temperature Range	Vin = Zero (no power)	-55		85	°C
Absolute maximums are stress ratings. Exposure of de	evices to greater than any of these conditions may a	dversely affect long-te	rm reliability. Proper oper	ration under conditions	other than those
listed in the Performance/Functional Specifications Ta	ble is not implied or recommended.				
INPUT					
Operating Input Voltage Range		16.8	24, 36, 48, 72, 96,110	160	Vdc
Recommended External Fuse	Fast blow		See PUL (P.17)		A
Start-up Voltage	Rising input voltage		16.5	16.7	Vdc
Undervoltage Shutdown (PUL set for 24Vin)	Falling input voltage. (14.4V for 100ms)		15.5		Vdc
Overvoltage Shutdown	Rising input voltage		170.0		Vdc
Reverse Polarity Protection [7]	With installed external fuse		Yes		Vdc
Input Current			11		
Full Load Conditions	Vin @ 110V nominal		3.0		A
Full Load Conditions	Vin @ 24V nominal		14.0		A
Low Line	Vin = minimum , 25A load		21		A
Inrush Transient			2.7		A
No Load Input Power	110Vin typ		2.5		W
Shut-Down Mode Input Power	nominal input voltage (110V)		1.4		W
GENERAL and SAFETY					
	Vin=24V, full load		89		%
Efficiency	Vin=110V, full load	88.5	92		%
Isolation	· · · · · · · · · · · · · · · · · · ·				
Isolation Voltage, Input to Output		4250			Vdc
Isolation Voltage, Input to Case		2830			Vdc
Isolation Voltage, Case to Output		1420			Vdc
Insulation Resistance	Measured with 500Vdc		100		MΩ
Safety Rating			Reinforced		
Safety (Designed to meet the following require-	UL 62368-1, IEC/EN62368-1, Demko		Approved		
ments)	EN 45545, HL1 to HL3 fire/smoke		Pending		
Calculated MTBF [2]	Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=40°C		1.02		Hours x 106
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency	Stage 1/Stage 2		250/200		kHz
Power Up Startup Time	Power On to Vout regulated		350		mS
On/Off Startup Time	Remote On to Vout regulated		50		mS
Dynamic Load Response	50-75-50% load step, settling time to within $\pm 1\%$ of Vout		50	350	μSec
Dynamic Load Peak Deviation	Same as above,		±100	±200	mV
FEATURES and OPTIONS	· · · · ·		•		
Remote On/Off Control [3]					
Positive Logic					
Positive Logic, ON state	ON=Pin open or external voltage	4		15	Vdc
Positive Logic, OFF state	OFF=Pin grounded or external voltage	0		0.7	Vdc
Control Current	Open collector/drain, sinking		1	2	mA
Programmable Undervoltage Lockout (PUL)	See Page 17 for details				
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FUNCTIONAL SPECIFICATIONS, IRV300-12

IRV300 Series

300W 10:1 Ultra Wide Input Chassis-Mount Isolated DC-DC Converter

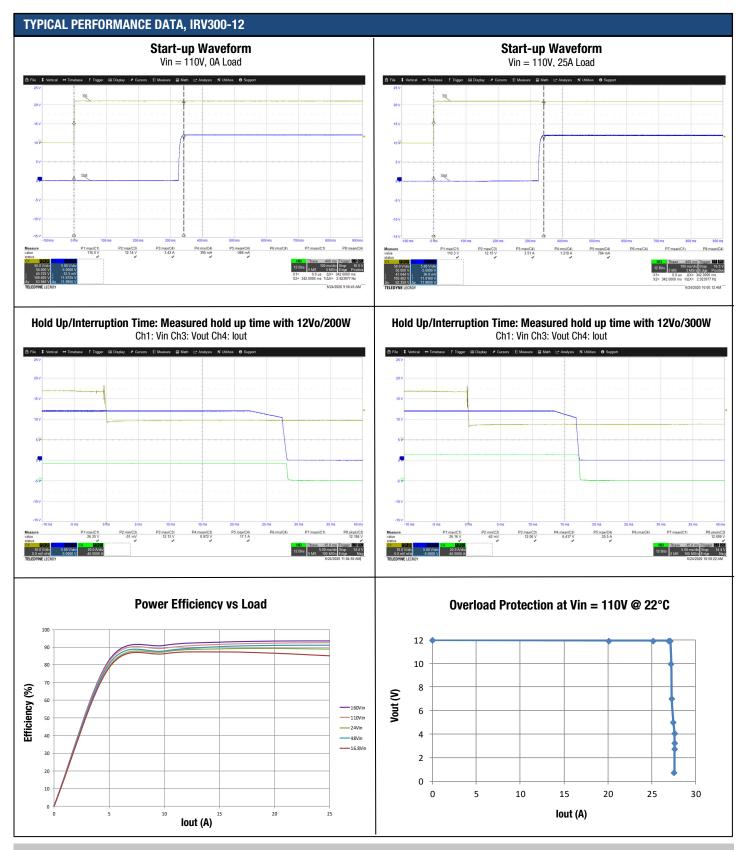
FUNCTIONAL SPECIFICATIONS, IRV300-12 (CONT.)

OUTPUT	Conditions [1]	Minimum	Typical/Nominal	Maximum	Units
Total Output Power	See Derating	0	300	303	W
Voltage	·				
Nominal Output Voltage	No trim	11.88	12.00	12.12	Vdc
Setting Accuracy	At 50% load		1		% of Vnom.
Output Voltage Range [5]	User-adjustable	-8		+15	% of Vnom.
Overvoltage Protection [6]	Latching Mode	14.5	16	17.5	Vdc
Current	· · ·		· · ·		
Output Current Range	Vin=16.8V-160V	0.0	25.0		A
Short Circuit					
Short Circuit Current	Constant current mode	25.1	28	31	А
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Constant Current limiting				
Regulation [4]					
Line Regulation	Vin=16.8V to 160V, output @ nominal load			±0.5	%
Load Regulation	lout=min. to max., Vin=110V			±0.5	%
Ripple and Noise	with a 1uF 10uF output caps		60	120	mV pk-pk
Temperature Coefficient	At all outputs		0.02		% of Vnom./°C
Maximum Capacitive Load	Constant resistance mode		0.1		F
Hold-up (Optional)	EN550155: Class S2 (@300W) / Class S3 (@180W)	10 / 20			mS
MECHANICAL					
Outline Dimensions			7.27 x 4.57 x 1.56		Inches
(Please refer to outline drawing)	L x W x H		184.6 x 116 x 39.7		mm
Case Material			Aluminum, Black Anodized		
Weight			32		Ounces
			900		Grams
EMI/RFI Shielding			Case		
ENVIRONMENTAL		u de la construcción de la constru La construcción de la construcción d			
Operating Ambient Temperature Range	Continuous (for 10min)	-40		70 (85)	°C
Operating Case Temperature Range	No derating	-40		90	0°
Thermal Protection/Shutdown			Yes		0°
Storage Temperature	Vin = Zero (no power)	-55		85	°C
Altitude				3000	m
Electromagnetic Interference	Meets EN50121-3-2				

Performance Specification Notes

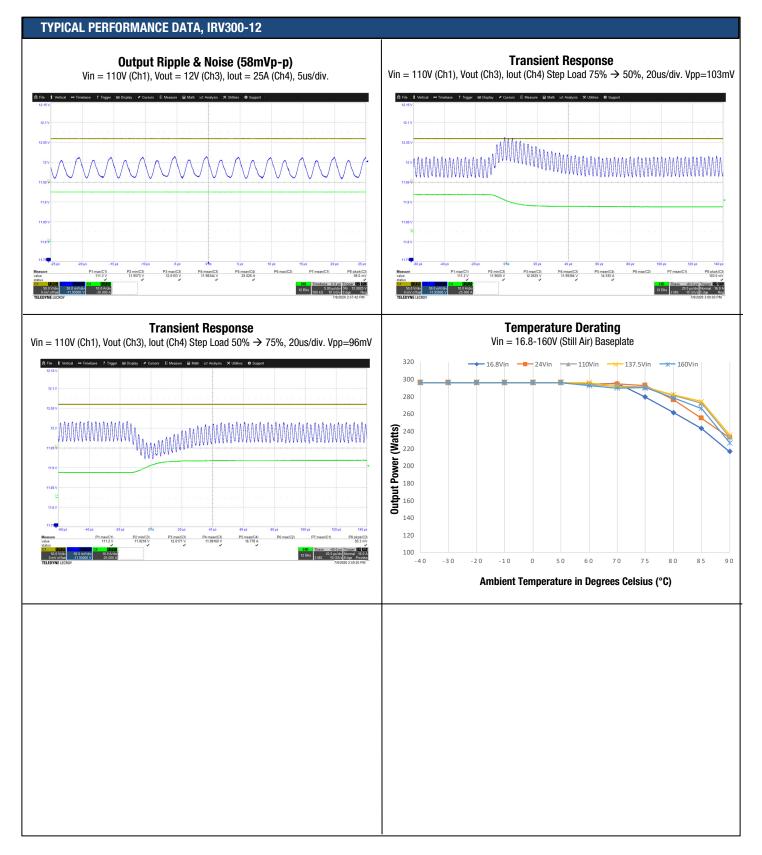
- 1. All specifications are typical unless noted. Ambient temperature =+25°Celsius, Vin is nominal, output current is maximum rated nominal.
- 2. Mean Time Before Failure (MTBF) is calculated using the Telcordia (Belcore) SR-332 Method 1, Case 3, Issue 3, Ground Benign, Controlled. Operating temperature = +40°C, full output load, natural air convection.
- 3. The On/Off Control is normally driven from a switch or relay. An open collector/open drain transistor may be used in saturation and cut-off (pinch-off) modes. External logic may also be used if voltage levels are fully compliant to the specifications.
- 4. Regulation specifications describe the deviation as the input line voltage or output load current is varied from a nominal midpoint value to either extreme (50% load).
- $5. \hspace{0.5cm} \text{Do not exceed maximum power ratings or output overvoltage when adjusting output trim values.}$
- 6. Output over-voltage protection (OVP) is latching mode. Recycle input to enable, after the output over-voltage condition has been removed.
- 7. If reverse polarity is accidentally applied to the input, to ensure reverse input protection, always connect an external fast blow input fuse in series with the +Vin input.

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FUNCTIONAL SPECIFICATIONS IBV300-24

ABSOLUTE MAXIMUM RATINGS	Conditions [1]	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous	Full temperature range	16.8		160	Vdc
Input Voltage, Transient	14.4V (100mS, per EN50155) / 168V (100mS)	14.4		168	Vdc
Output Power		0		303	W
Output Current	Current-limited, no damage, short-circuit protected	0		16.5	A
Storage Temperature Range	Vin = Zero (no power)	-55		85	°C
Absolute maximums are stress ratings. Exposure of de listed in the Performance/Functional Specifications Ta		versely affect long-t	erm reliability. Proper opera	tion under conditions	other than thos
INPUT					
Operating Input Voltage Range		16.8	24, 36, 48, 72, 96,110	160	Vdc
Recommended External Fuse	Fast blow		See PUL (P.17)		A
Start-up Voltage	Rising input voltage		16.5		Vdc
Undervoltage Shutdown (PUL set for 24Vin)	Falling input voltage. (14.4V for 100ms)		15.5		Vdc
Overvoltage Shutdown	Rising input voltage		170.0		Vdc
Reverse Polarity Protection [7]	With installed external fuse		Yes		Vdc
Input Current			100		1 100
Full Load Conditions	Vin @ 110V nominal		3.00		A
Full Load Conditions	Vin @ 24V nominal		14.1		A
Low Line	Vin = minimum , 12.5A load		20.6		A
Inrush Transient			2.7		A
No Load Input Power	110Vin typ		2.1		Ŵ
Shut-Down Mode Input Power	nominal input voltage (110V)		1.4		W
GENERAL and SAFETY	nonina inpat voltage (110v)		1.7		
	Vin=24V, full load		88.1		%
Efficiency	Vin=110V, full load	89.5	91.5		%
Isolation			· ·		
Isolation Voltage, Input to Output		4250			Vdc
Isolation Voltage, Input to Case		2830			Vdc
Isolation Voltage, Case to Output		1420			Vdc
Insulation Resistance	Measured with 500Vdc		100		MΩ
Safety Rating			Reinforced		
Safety (Designed to meet the following require-	UL 62368-1, IEC/EN62368-1, Demko		Approved		
ments)	EN 45545, HL1 to HL3 fire/smoke		Pending		
Calculated MTBF [2]	Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=40°C		1.03		Hours x 10 ⁶
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency	Stage 1/Stage 2		250/200		kHz
Power Up Startup Time	Power On to Vout regulated		350		mS
On/Off Startup Time	Remote ON to Vout regulated		50		mS
Dynamic Load Response	50-75-50% load step, settling time to within ±1% of Vout		150	350	μSec
Dynamic Load Peak Deviation	Same as above,		±100	±200	mV
FEATURES and OPTIONS					
Remote On/Off Control [3]					
Positive Logic					
Positive Logic, ON state	ON=Pin open or external voltage	4		15	Vdc
Positive Logic, OFF state	OFF=Pin grounded or external voltage	0	+ +	0.7	Vdc
Control Current	Open collector/drain, sinking	0	1	2	mA

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FUNCTIONAL SPECIFICATIONS, IRV300-24 (CONT.)

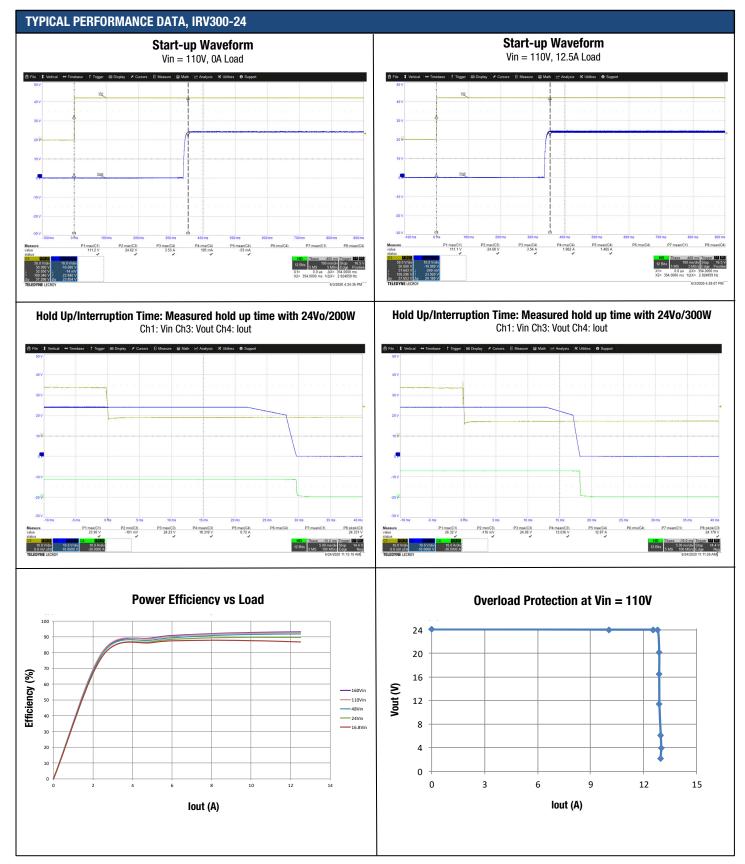
OUTPUT	Conditions [1]	Minimum	Typical/Nominal	Maximum	Units
Total Output Power	See Derating	0	300	303	W
Voltage					
Nominal Output Voltage	No trim	23.76	24	24.24	Vdc
Setting Accuracy	At 50% load		±1		% of Vnom.
Output Voltage Range [5]	User-adjustable	-10		+10	% of Vnom.
Overvoltage Protection [6]	Latching Mode	28	30	33	Vdc
Current	· · · · · · · · · · · · · · · · · · ·		· · ·		
Output Current Range	Vin=16.8V-160V	0	12.5		A
Short Circuit			1		
Short Circuit Current	Constant current mode	12.6	14.4	16.5	А
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Constant Current limiting				
Regulation [4]	· · · · · · · · · · · · · · · · · · ·		· · ·		
Line Regulation	Vin=min. to max., Vout=nom., full load		±0.5		%
Load Regulation	lout=min. to max., Vin=110V		±0.5		%
Ripple and Noise	with a 1uF 10uF output caps		75	240	mV pk-pk
Temperature Coefficient	At all outputs		±0.02		% of Vnom./°C
Maximum Capacitive Load	Constant resistance mode			0.1	F
Hold-up (Optional)	EN550155: Class S2 (@300W) / Class S3 (@180W)	10 / 20			mS
MECHANICAL					
Outline Dimensions			7.27 x 4.57 x 1.56		Inches
(Please refer to outline drawing)	L x W x H		184.6 x 116 x 39.7		mm
Case Material			Aluminum, Black Anodized		
Weight			32		Ounces
			900		Grams
EMI/RFI Shielding			Case		
ENVIRONMENTAL					
Operating Ambient Temperature Range	Continuous (for 10min)	-40		70 (85)	°C
Operating Case Temperature Range	No derating	-40		90	°C
Thermal Protection/Shutdown	Temperature on PCB		Yes		°C
Storage Temperature	Vin = Zero (no power)	-55		85	°C
Altitude				3000	m
Electromagnetic Interference	Meets EN50121-3-2				

Performance Specification Notes

- 1. All specifications are typical unless noted. Ambient temperature =+25°Celsius, Vin is nominal, output current is maximum rated nominal.
- 2. Mean Time Before Failure (MTBF) is calculated using the Telcordia (Belcore) SR-332 Method 1, Case 3, Issue 3, Ground Benign, Controlled. Operating temperature = +40°C, full output load, natural air convection.
- 3. The On/Off Control is normally driven from a switch or relay. An open collector/open drain transistor may be used in saturation and cut-off (pinch-off) modes. External logic may also be used if voltage levels are fully compliant to the specifications.
- 4. Regulation specifications describe the deviation as the input line voltage or output load current is varied from a nominal midpoint value to either extreme (50% load).
- 5. Do not exceed maximum power ratings or output overvoltage when adjusting output trim values.
- 6. Output over-voltage protection (OVP) is latching mode. Recycle input to enable, after the output over-voltage condition has been removed.
- 7. If reverse polarity is accidentally applied to the input, to ensure reverse input protection, always connect an external fast blow input fuse in series with the +Vin input.

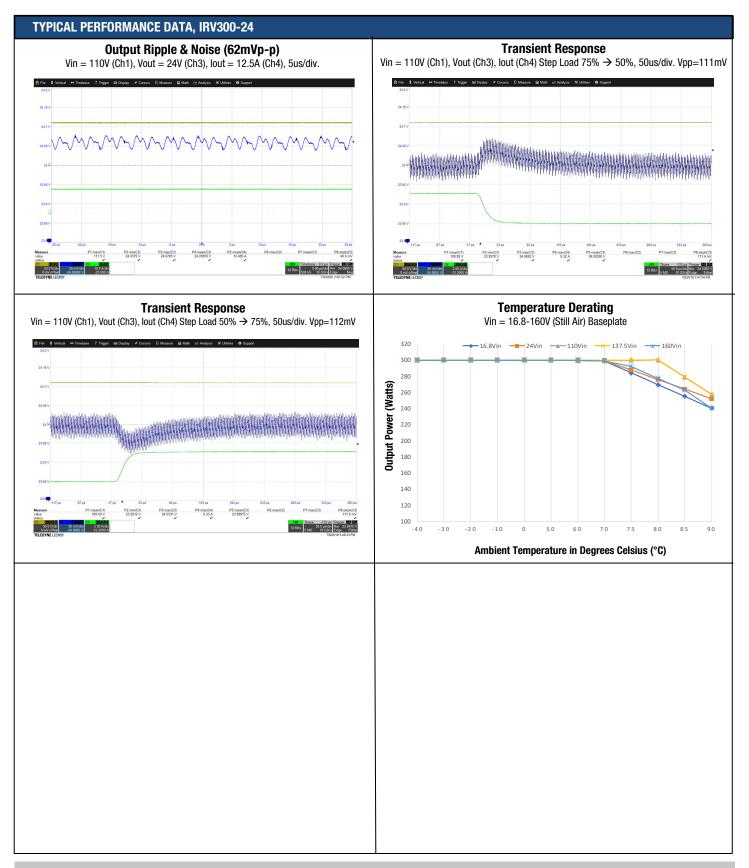
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300W 10:1 Ultra Wide Input Chassis-Mount Isolated DC-DC Converter

FUNCTIONAL SPECIFICATIONS, IRV300-54

Input Varlage, ContinuousFull temperature range16.816.0Vdc.Input Varlage, Transient14.4V (100ns, per EN6055) / 169V (100ms)14.416.8Vdc.Output Dovern00305Wdc.Storage Temperature RangeOur methinition, no damage, short-cinici protected0305Wdc.Storage Temperature RangeVm = Zero (top power)-5585Cc.Absolde maximums are stess ratings. Exposure of devices to greater thma any of these conditions may adversely affect long-term reliability. Proper operation under conditions:Wdc.NordRecommended External FuseTB.872.4, 36, 49.16.0Wdc.Recommended External FuseFatto biowTB.8Vdc.Wdc.NordResonational Specifications Table in traffic devices to greater thma providiageTB.8Vdc.Wdc.Recommended External FuseFatto biowTB.8Vdc.Wdc.Wdc.NordResonating input voltageTB.8Wdc.Wdc.Overvoltage Shutdown (PUL set for 24Vin)Fatto bio with misside devices for adma fuseWdc.Wdc.Patto additionsVm P mithing. (L4.4V for 100ms)TB.8Wdc.Wdc.Nord TableWith misside devices for adma fuseWdc.Wdc.Wdc.Patto additionsVm P mithing. (L4.4V for 100ms)TB.8Wdc.Wdc.Nord TableWith misside devices for adma fuseWdc.Wdc.Wdc.Patto additionsVm P mithing. (L4.4V for 100ms)TB.8Wdc.Wdc.<	ABSOLUTE MAXIMUM RATINGS	Conditions [1]	Minimum	Typical/Nominal	Maximum	Units
Output Darrent O 305 W Strange Temperature Range Unrent-limited, no damage, stort-circut protected 0 189 A Strange Temperature Range Win = Zero, (mp power) -56 189 -7C Absolate maximums are sites ratings, Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those indevices to implete our recommonded. -66 24, 88, 48, 74 -7C Apendie maximums are sites ratings, Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those indevices to recommonded. -7G -7G Apendie maximum are sites ratings, Exposure of devices to greater than any of these conditions may adversely affect long. The Provide ratio of the Provide rati Provide rati Provide ratio of the Provide rati Prov	Input Voltage, Continuous	Full temperature range	16.8		160	Vdc
Output Current Current-limited, no damage, short-incut prodected 0 TED A Storage Temperature Range Vin 2 Aro (no power) -55 85 -9C Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those issee in the product of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those issee issee it that any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those issee issee it that any of these conditions and version of the product devices to greater than any of these conditions and version of the product devices to greater than any of these conditions and version of the product devices that any of these conditions is provide and the product devices that any of these conditions are stored and the product devices that any of these conditions are stored and the product devices that any of these conditions are stored and the product devices that any of these conditions are stored and the product devices that any of these conditions are stored and the product devices that any of these conditions are stored and the product devices that any of these conditions are stored and the product devices that any of these conditions are stored and the product devices that any of these conditions are stored and the product devices that any of these conditions are stored and the product devices that are sto	Input Voltage, Transient	14.4V (100mS, per EN50155) / 168V (100mS)	14.4		168	Vdc
Storage Persperature Range Win = Zero (no pown) -55 85 9C Absolute maximums are stress mitings: Exposer of defices to grader than any of these conditions my adversely affect long-term reliability. Proge operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended. 16.8 72.4 86.48 70 Vice Operating input Voltage Range Fast blow 16.8 72.4 86.48 0 40 Recommended External Fuse Fast blow TBD 40 40 40 40 Overothage Shutdrown (PUL set for 24Vin) Falling input voltage TBD Vide 40	Output Power		0		305	W
Absolute maximum are astrages ratings. Exposure of devices to grater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than this is lise in the Promomended. INPUT	Output Current	Current-limited, no damage, short-circuit protected	0		TBD	A
listed in the Performance/Functional Specifications Table is not implied or recommended. NPUT Operating input Voltage Range Performance/Functional Specifications Table is not implied or recommended External Fuse Fast blow Fast publicate Fast publicate Fast blow Fast publicate Fa	Storage Temperature Range	Vin = Zero (no power)	-55		85	°C
UNUT 24, 36, 48, 72, 95,110 160 Vdc Operating input Voltage Fast blow TBD A Start-up Voltage Hising input Voltage TBD Vdc Overoatge Shutdown (PUL set for 24Vin) Falling input Voltage TBD Vdc Reverse Polarity Protection (7) With installed external tase TBD Vdc Ingut Current Fall cad Conditions Vin @ 110V nominal TBD A Full cad Conditions Vin @ 240 nominal TBD A Low Line Vin = minimum, 6.25A load TBD A Shut-Down Mode Input Power Vin max, 0;v071 = 0 TBD W Shut-Down Mode Input Power Vin=110V, full load 89.5 91.5 % Sturt-Down Mode Input Power Vin=110V, full load 89.5 91.5 % Sturt-Down Mode Input Power Vin=110V, full load 89.5 91.5 % Sturt-Down Mode Input Power Vin=110V, full load 89.5 91.5 % Sturt-Down Mode Input Power Vin=110V, full load 89.5 91.5 <td></td> <td></td> <td>versely affect long-te</td> <td>erm reliability. Proper opera</td> <td>tion under conditions</td> <td>other than those</td>			versely affect long-te	erm reliability. Proper opera	tion under conditions	other than those
Operating input Votage nange Inco. Vice Start-up Votage Rising input votage (14 AV or 10ms) TBD A Start-up Votage Rising input votage, (14 AV or 10ms) TBD Vide Overvotage Shutdown (PUL set for 24Vin) Palling input votage, (14 AV or 10ms) TBD Vide Overvotage Shutdown (PUL set for 24Vin) Palling input votage, (14 AV or 10ms) TBD Vide Pall Load Conditions Vin @ 110V nominal TBD A Full Load Conditions Vin @ 110V nominal TBD A Full Load Conditions Vin @ 24V nominal TBD A Inrush Transient TBD M A No Load Input Power 110Vin typ TBD W Sturt-Down Mode Input Power Vin minimum, 0:23A load 9 W Sturt-Down Mode Input Power Vin minimum, 0:23A load 9 W W Sturt-Down Mode Input Power Vin minimum, 0:23A load 88.0 9 % 5 Sturt-Down Mode Input Power Vin minimum, 0:23A load 88.0 9 % 5<						
Recommended External Puse Fast blow TBD A Sart-up Voltage Rising input voltage HBD Vdc Overroltage Stutidown (PUL set for 24Vin) Failing input voltage HBD Vdc Reverse Polarity Protection (7) With installed external fuse Yes Vdc Input Conditions Vin @ 110V nominal TBD Vdc Full Load Conditions Vin @ 110V nominal TBD A Low Line Vin @ 24V nominal TBD A Low Line Vin @ 24V nominal TBD A No Load Input Power 110Vin typ TBD WW Shut-Down Mode Input Power Vin min/max, 0n/0ff = 0 TBD W Shut-Down Mode Input Power Vin min/max, 0n/0ff = 0 TBD W Shut-Down Mode Input Power Vin min/max, 0n/0ff = 0 Stot % Isolation Vin = 24V, full load 89.5 Stot.5 % Isolation Voltage, Input to Output Measured with 500Vdc 1500 Vdc Vac Isolation Voltage, Input to Output Measured wi	Operating Input Voltage Range		16.8		160	Vdc
Undervoltage Shutdown (PUL set for 24Vin) Falling input voltage (14 A/ for 100ms) TBD Vdc Overvoltage Shutdown (PUL set for 24Vin) Rising input voltage (14 A/ for 100ms) TBD Vdc Reverse Polarity Protection (7) With installed external use TBD Vdc Full Load Conditions Vm @ 110V nominal TBD A Full Load Conditions Vm @ 110V nominal TBD A Full Load Conditions Vm @ 110V nominal TBD A Innush Transient Vin = minimum , 6.26A load TBD A No Load Input Power 110Vin typ TBD W W Shut-bown Mode Input Power Vin=24V, full load 86.0 % % Isolation Voltage, Input to Output Vin=24V, full load 86.0 % % Isolation Voltage, Input to Coutput Measured with 500Vdc 1000 MQc MQc Isolation Voltage, Case to Output Measured with 500Vdc 100.0 MQc MQc Isolation Voltage, Input to Case Measured with 500Vdc 100.0 MQc MQc	Recommended External Fuse	Fast blow				Α
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Dervotrage Shutdown i Rising input voltage i TBD Vide Reverse Polarity Protection [7] With installed oxtornal fuse Yes Vide Reverse Polarity Protection [7] With installed oxtornal fuse Yes Vide Full Lad Conditions Vin @ 110V nominal TBD A A Low Line Vin = minimum, 6.25A load TBD A A Low Line Vin = minimum, 6.25A load TBD M A No Load Input Power Vin min/max, On/Off = 0 Shut-Down Mode Input Power Vin min/max, On/Off = 0 Shut-Down Mode, Input to Case Shut-Down Mode, Input to Case Vin=110V, full load 89.5 Shaton Vinage, Input to Case Vin=110V, full load 89.5 Shaton Vinage, Input to Case Neasured with 500Vdc 100 Safety Rating Vin = 140, Safety Rever Vin Shut Power Vin Shut Power Vin Min/Max, Safety Rating Power Output 100, Information Power Vin Tisolation Vinage, Sae to Output 100, Viac Nation Power Viac Nation Resistance Neasured with 500Vdc 100 Safety Rating Vin E Via Shut Power Power Via Shut Power Via Shut Power Via Shut Power Via						
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Shut-Down Mode Input Power Vin min/max, 0n/Off = 0 TBD W GENERAL and SAFETY Vin=24V, full load 86.0 % Efficiency Vin=24V, full load 89.5 91.5 % Isolation Vin=110V, full load 89.5 91.5 % Isolation Voltage, Input to Output 4250 Vdc Vdc Isolation Voltage, Case to Output 1500 Vdc Vdc Isolation Voltage, Case to Output 1500 Vdc Vdc Isolation Voltage, Case to Output 100 MQ MQ Safety Rating UL 62368-1, Demko Approved Safety (Designed to meet the following requirements) UL 62368-1, IEC/EN62368-1, Demko Approved Calculated MTBF [2] Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=40°C TBD Hours x 10° OVNAMIC CHARACTERISTICS Fixed Switching Frequency Stage 1/Stage 2 250/200 kHz Power Up Startup Time Remote On to Vout regulated 354 mS MC OvfOrd Startup Time Remote On to Vout regula		110Vin tvn				
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$\begin{tabular}{ c c c c c c } \hline Vin=24V, full load & 86.0 & % \\ \hline Vin=110V, full load & 89.5 & 91.5 & 0 & \% \\ \hline Vin=110V, full load & 89.5 & 91.5 & 0 & \% \\ \hline Vin=110V, full load & 89.5 & 91.5 & 0 & \% \\ \hline Vin=110V, full load & 89.5 & 91.5 & 0 & \% \\ \hline Isolation Voltage, Input to Output & 4250 & Vdc & Vdc & 2830 & Vdc & Vdc & 1800 & Vdc & 1800 & Vdc & 1800 & Vdc & 1800 & M\Omega \\ \hline Isolation Voltage, Case to Output & 1800 & 0.0 & Vdc & 100 & M\Omega & Safety Rating & UL 62368-1, IEC/EN62368-1, Demko & Approved & 0 & 0.0 & Vdc & 0 & 0.0 & Vdc & 0 & 0.0 & Vdc & 0 & 0.0 & 0 & 0.0 & 0 & 0.0 & 0 & 0 &$	•			TDD		
Entriency Vin=110V, full load 89.5 91.5 % Isolation Vin=110V, full load 89.5 91.5 % Isolation Voltage, Input to Output 4250 Vdc Vdc Isolation Voltage, Input to Case 2830 Vdc Vdc Isolation Voltage, Case to Output 1500 Vdc Vdc Isolation Voltage, Case to Output Measured with 500Vdc 100 MΩ Safety Rating UL 62368-1, IEC/EN62368-1, Demko Approved Safety (Designed to meet the following requiremements) UL 62368-1, IEC/EN62368-1, Demko Approved Ealculated MTBF [2] Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=-40°C TBD Hours x 10° DVNAMIC CHARACTERISTICS Fixed Switching Frequency Stage 1/Stage 2 250/200 kHz Power Up Startup Time Power On to Vout regulated 354 mS Dynamic Load Response 50-75-50% load step, setting time to within ±1% of Vout TBD TBD µSec Dynamic Load Peak Deviation Same as above, ±TBD ±TBD mV FEATURES and OPTIONS Same as above, ±TBD <td></td> <td>Vin=24V, full load</td> <td></td> <td>86.0</td> <td></td> <td>%</td>		Vin=24V, full load		86.0		%
Isolation Voltage, Input to Output 4250 Vdc Isolation Voltage, Input to Case 22830 Vdc Isolation Voltage, Case to Output 1500 Vdc Isolation Resistance Measured with 500Vdc 100 MΩ Safety Rating Reinforced Mca MΩ Safety (Designed to meet the following requirements) UL 62368-1, IEC/EN62368-1, Demko Approved MΩ Safety (Designed to meet the following requirements) UL 62368-1, IEC/EN62368-1, Demko Approved Must Status M	Efficiency		89.5			
Isolation Voltage, Input to Case 2830 Vdc Isolation Voltage, Case to Output 1500 Vac Insulation Resistance Measured with 500Vdc 1500 Vdc Safety Rating Insulation Resistance 100 MΩ Safety Rating UL 62368-1, IEC/EN62368-1, Demko Reinforced Insulation Resistance Safety (Designed to meet the following requirements) UL 62368-1, IEC/EN62368-1, Demko Approved Insulation Resistance Pending Calculated MTBF [2] Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=40°C TBD Hours x 10° DYNAMIC CHARACTERISTICS Fixed Switching Frequency Stage 1/Stage 2 250//200 kHz Power Up Startup Time Power On to Vout regulated 354 mS On/Off Startup Time Remote On to Vout regulated 50 mS Dynamic Load Response 50-75-50% load step, setting time to within ±1% of Vout TBD TBD µSec Positive Logic ON/ES Amende On/Off Control [3] TBD ±TBD mV Positive Logic, OFF state OFF=Pin grounded or external voltage	Isolation			<u> </u>		
Isolation Voltage, Case to Output Measured with 500Vdc 1500 Vac Insulation Resistance Measured with 500Vdc 100 MΩ Safety Rating Reinforced MΩ Safety Rating UL 62368-1, IEC/EN62368-1, Demko Approved Safety (Designed to meet the following requirements) UL 62368-1, IEC/EN62368-1, Demko Approved Calculated MTBF [2] Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=40°C TBD Hours x 10° DYNAMIC CHARACTERISTICS Fixed Switching Frequency Stage 1/Stage 2 250/200 kHz Power Up Startup Time Power On to Vout regulated 354 mS On/Off Startup Time Remote On to Vout regulated 50 mS Dynamic Load Response 50-75-50% load step, settling time to within ±1% of Vout TBD ±TBD µSec Positive Logic, ON state ON=Pin open or external voltage 4 15 Vdc Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.77 Vdc	Isolation Voltage, Input to Output		4250			Vdc
Insulation Resistance Measured with 500Vdc 100 MΩ Safety Rating Reinforced Reinforced MΩ Safety Rating UL 62368-1, IEC/EN62368-1, Demko Approved MΩ Safety (Designed to meet the following requirements) UL 62368-1, IEC/EN62368-1, Demko Approved MΩ Calculated MTBF [2] Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=40°C TBD Hours x 10° DYNAMIC CHARACTERISTICS Fixed Switching Frequency Stage 1/Stage 2 250/200 kHz Power Up Startup Time Power On to Vout regulated 354 mS MS Dynamic Load Response 50-75-50% load step, settling time to within ±1% of Vout TBD TBD µSec Positive Logic, ON State ON=Pin open or external voltage 4 15 Vdc Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.7 Vdc	Isolation Voltage, Input to Case		2830			Vdc
Safety Rating Reinforced Reinforced Safety (Designed to meet the following requirements) UL 62368-1, IEC/EN62368-1, Demko Approved Approved EN 45545, HL1 to HL3 fire/smoke Pending Mours x 10° Calculated MTBF [2] Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=40°C TBD Hours x 10° DYNAMIC CHARACTERISTICS Fixed Switching Frequency Stage 1/Stage 2 250/200 KHz Power Up Startup Time Power On to Vout regulated 354 mS On/Off Startup Time Remote On to Vout regulated 50 mS Dynamic Load Response 50-75-50% load step, settling time to within ±1% of Vout TBD ±TBD µSec Dynamic Load Peak Deviation Same as above, ±TBD ±TBD mV FEATURES and OPTIONS Features UL 601 15 Vdc Positive Logic, ON state ON=Pin open or external voltage 0 0.7 Vdc Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.7 Vdc	Isolation Voltage, Case to Output		1500			Vac
Safety Rating Reinforced Reinforced Safety (Designed to meet the following requirements) UL 62368-1, IEC/EN62368-1, Demko Approved Approved EN 45545, HL1 to HL3 fire/smoke Pending Mours x 10° Calculated MTBF [2] Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=40°C TBD Hours x 10° DYNAMIC CHARACTERISTICS Fixed Switching Frequency Stage 1/Stage 2 250/200 KHz Power Up Startup Time Power On to Vout regulated 354 mS On/Off Startup Time Remote On to Vout regulated 50 mS Dynamic Load Response 50-75-50% load step, settling time to within ±1% of Vout TBD ±TBD µSec Dynamic Load Peak Deviation Same as above, ±TBD ±TBD mV FEATURES and OPTIONS Features UL 601 15 Vdc Positive Logic, ON state ON=Pin open or external voltage 0 0.7 Vdc Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.7 Vdc	Insulation Resistance	Measured with 500Vdc		100		ΜΩ
Safety (Designed to meet the following requirements) UL 62368-1, IEC/EN62368-1, Demko Approved Safety (Designed to meet the following requirements) EN 45545, HL1 to HL3 fire/smoke Pending Calculated MTBF [2] Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=40°C TBD Hours x 10° DYNAMIC CHARACTERISTICS Fixed Switching Frequency Stage 1/Stage 2 250/200 kHz Power Up Startup Time Power On to Vout regulated 354 mS On/Off Startup Time Remote On to Vout regulated 50 mS Dynamic Load Response 50-75-50% load step, settling time to within ±1% of Vout TBD TBD µSec Dynamic Load Peak Deviation Same as above, ±TBD ±TBD mV FEATURES and OPTIONS Remote On/Off Control [3] Positive Logic, ON state ON=Pin open or external voltage 0 0.7 Vdc Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.7 Vdc						
ments)EN 45545, HL1 to HL3 fire/smokePendingCalculated MTBF [2]Per Telcordia SR-332, Issue 3, Case 3, Ground Benign controlled, Tambient=40°CTBDHours x 10°DYNAMIC CHARACTERISTICSFixed Switching FrequencyStage 1/Stage 2250/200kHzPower Up Startup TimePower On to Vout regulated354mSOn/Off Startup TimeRemote On to Vout regulated50mSDynamic Load Response50-75-50% load step, settling time to within ±1% of VoutTBDTBDμSecDynamic Load Peak DeviationSame as above,±TBD±TBDmVFEATURES and OPTIONSPositive Logic, ON statePositive Logic, ON stateON=Pin open or external voltage415VdcPositive Logic, OFF stateOFF=Pin grounded or external voltage00.7VdcControl CurrentOpen collector/drain, sinking12mA		UL 62368-1, IEC/EN62368-1, Demko		1		
Calculated W1BF [2]Benign controlled, Tambient=40°CTBDHours x 10%DYNAMIC CHARACTERISTICSFixed Switching FrequencyStage 1/Stage 2250/200kHzPower Up Startup TimePower On to Vout regulated354mSOn/Off Startup TimeRemote On to Vout regulated354mSDynamic Load Response50-75-50% load step, settling time to within ±1% of VoutTBDTBDµSecDynamic Load Peak DeviationSame as above,±TBD±TBDmVFEATURES and OPTIONSPositive Logic, ON stateON=Pin open or external voltage415VdcPositive Logic, OFF stateOFF=Pin grounded or external voltage00.7VdcControl CurrentOpen collector/drain, sinking12mA		EN 45545, HL1 to HL3 fire/smoke		Pending		
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Power Up Startup Time Power On to Vout regulated 354 ms On/Off Startup Time Remote On to Vout regulated 354 ms Dynamic Load Response 50-75-50% load step, settling time to within ±1% of Vout TBD TBD µSec Dynamic Load Response 50-75-50% load step, settling time to within ±1% of Vout TBD ±TBD µSec Dynamic Load Peak Deviation Same as above, ±TBD ±TBD mV FEATURES and OPTIONS Remote On/Off Control [3] Positive Logic ON=Pin open or external voltage 4 15 Vdc Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.7 Vdc Control Current Open collector/drain, sinking 1 2 mA	DYNAMIC CHARACTERISTICS			· · ·		·
On/Off Startup Time Remote On to Vout regulated 501 MS Dynamic Load Response 50-75-50% load step, settling time to within ±1% of Vout TBD TBD μSec Dynamic Load Response 50-75-50% load step, settling time to within ±1% of Vout TBD TBD μSec Dynamic Load Peak Deviation Same as above, ±TBD ±TBD mV FEATURES and OPTIONS Remote On/Off Control [3] Positive Logic Positive Logic, ON state ON=Pin open or external voltage 4 15 Vdc Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.7 Vdc Control Current Open collector/drain, sinking 1 2 mA	Fixed Switching Frequency	Stage 1/Stage 2		250/200		kHz
Dynamic Load Response 50-75-50% load step, settling time to within ±1% of Vout TBD TBD μSec Dynamic Load Peak Deviation Same as above, ±1% of Vout ±1% of Vout<		Power On to Vout regulated		354		mS
Dynamic Load Response ±1% of Vout TBD TBD μSec Dynamic Load Peak Deviation Same as above, ±TBD ±TBD mV FEATURES and OPTIONS Remote On/Off Control [3] Positive Logic Positive Logic, ON state ON=Pin open or external voltage 4 15 Vdc Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.7 Vdc Control Current Open collector/drain, sinking 1 2 mA	On/Off Startup Time	Remote On to Vout regulated			50	mS
Dynamic Load Peak Deviation Same as above, ±TBD ±TBD mV FEATURES and OPTIONS Remote On/Off Control [3] Positive Logic Positive Logic, ON state ON=Pin open or external voltage 4 15 Vdc Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.7 Vdc Control Current Open collector/drain, sinking 1 2 mA	Dynamic Load Response			TBD	TBD	μSec
Remote On/Off Control [3] Positive Logic ON=Pin open or external voltage 4 15 Vdc Positive Logic, ON state OFF=Pin grounded or external voltage 0 0.7 Vdc Control Current Open collector/drain, sinking 1 2 mA	Dynamic Load Peak Deviation			±TBD	±TBD	mV
Remote On/Off Control [3] Positive Logic ON=Pin open or external voltage 4 15 Vdc Positive Logic, ON state OFF=Pin grounded or external voltage 0 0.7 Vdc Control Current Open collector/drain, sinking 1 2 mA	FEATURES and OPTIONS			· · ·		
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Positive Logic, ON state ON=Pin open or external voltage 4 15 Vdc Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.7 Vdc Control Current Open collector/drain, sinking 1 2 mA						
Positive Logic, OFF state OFF=Pin grounded or external voltage 0 0.7 Vdc Control Current Open collector/drain, sinking 1 2 mA	3	ON=Pin open or external voltage	4		15	Vdc
Control Current Open collector/drain, sinking 1 2 mA				1 1		
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	Programmable Undervoltage Lockout (PUL)	See Page 17 for details			-	

IRV300 Series

300W 10:1 Ultra Wide Input Chassis-Mount Isolated DC-DC Converter

FUNCTIONAL SPECIFICATIONS, IRV300-54 (CONT.)

OUTPUT	Conditions [1]	Minimum	Typical/Nominal	Maximum	Units
Total Output Power	See Derating	0	302	305	W
Voltage					
Nominal Output Voltage	No trim	53.46	54	54.54	Vdc
Setting Accuracy	At 50% load		±1		% of Vnom.
Output Voltage Range [5]	User-adjustable	47		57	Vdc
Overvoltage Protection [6]	Latching Mode	60	62.5	65	Vdc
Current					
Output Current Range	Vin=16.8V-160V	0	5.5		A
Short Circuit					I
Short Circuit Current	Constant current mode	TBD	TBD	TBD	А
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Constant current limiting				
Regulation [4]					
Line Regulation	Vin=min. to max., Vout=nom., full load			±0.5	%
Load Regulation	lout=min. to max., Vin=110DV			±0.5	%
Ripple and Noise	with a 1uF 10uF output caps		200	480	mV pk-pk
Temperature Coefficient			±0.02		% of Vnom./°C
Maximum Capacitive Load	Constant resistance mode	0	0.1		F
Hold-up (Optional)	EN550155: Class S2 (@300W) / Class 3 (@TBDW)	10 / 20			mS
MECHANICAL					
Outline Dimensions			7.27 x 4.57 x 1.56		Inches
(Please refer to outline drawing)	L x W x H		184.6 x 116 x 39.7		mm
Case Material			Aluminum, Black Anodized	ł	
Weight			32		Ounces
EMI/RFI Shielding			900 Case		Grams
ENVIRONMENTAL		<u> </u>	6455		
Operating Ambient Temperature Range	Continuous (for 10min.)	-40		70 (85)	°C
Operating Case Temperature Range	No derating	-40		90	<u> </u>
Thermal Protection/Shutdown	No defailing	0	Yes	50	<u> </u>
Storage Temperature	Vin = Zero (no power)	-55	100	85	0°
Altitude				3000	m
Electromagnetic Interference	Meets EN50121-3-2			5000	

Performance Specification Notes

- 1. All specifications are typical unless noted. Ambient temperature =+25°Celsius, Vin is nominal, output current is maximum rated nominal.
- Mean Time Before Failure (MTBF) is calculated using the Telcordia (Belcore) SR-332 Method 1, Case 3, Issue 3, Ground Benign, Controlled. Operating temperature = +40°C, full output load, natural air convection.
- The On/Off Control is normally driven from a switch or relay. An open collector/open drain transistor may be used in saturation and cut-off (pinch-off) modes. External logic may also be used if voltage levels are fully compliant to the specifications.
- 4. Regulation specifications describe the deviation as the input line voltage or output load current is varied from a nominal midpoint value to either extreme (50% load).
- 5. Do not exceed maximum power ratings or output overvoltage when adjusting output trim values.
- 6. Output over-voltage protection (OVP) is latching mode. Recycle input to enable, after the output over-voltage condition has been removed.
- 7. If reverse polarity is accidentally applied to the input, to ensure reverse input protection, always connect an external fast blow input fuse in series with the +Vin input.

IRV300 Series

TYPICAL PERFORMANCE DATA, IRV300-54	
TYPICAL PERFORMANCE DATA, IRV300-54 Start-up Waveform TBD	Start-up Waveform TBD
Hold Up/Interruption Time: Measured hold up time with 54Vo/200W	Hold Up/Interruption Time: Measured hold up time with 54Vo/300W TBD
Power Efficiency vs Load	Overload Protection at Vin = 110V @ 22°C
	TBD

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TYPICAL PERFORMANCE DATA, IRV300-54					
Output Ripple & Noise (TBDmVp-p) Vin = 110V (Ch1), Vout = 54V (Ch3), Iout = 5.5A (Ch4), 5us/div.	Transient Response Vin = 110V (Ch1), Vout (Ch3), lout (Ch4) Step Load 75% \rightarrow 50%, 50us/div. Vpp=TBDmV				
TBD	TBD				
Transient Response Vin = 110V (Ch1), Vout (Ch3), lout (Ch4) Step Load 50% \rightarrow 75%, 50us/div. Vpp=TBDmV	Temperature Derating Vin = 16.8-160V (Still Air) Baseplate				
TBD	TBD				
TBD					

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IRV300 Series

300W 10:1 Ultra Wide Input Chassis-Mount Isolated DC-DC Converter

ENVIRONMENTAL QUALIFICATION TESTING:

	Test Method	Standard	Test	t Conditions	Status
Ad	Low temperature start-up test	EN 50155:2017, clause 13.4.4 IEC/EN 60068-2-1	Temperature, duration: Performance test:	-40 °C, 2 h +25 °C	Not operating
Be	Dry heat test cycle A	EN 50155:2017, clause 13.4.5 IEC/EN 60068-2-2	Temperature: Duration:	70 °C 6 h	Operating perf. crit. A
Db 2	Cyclic damp heat test	EN 50155:2017, clause 13.4.7 IEC/EN 60068-2-30	Temperature: Cycles (respiration effect) Duration:	55 °C and 25 °C 2 2x 24 h	Not operating
Ка	Salt mist test sodium chloride (NaCl) solution	EN 50155:2017, clause 13.4.10 IEC/EN 60068-2-11	Temperature: Duration:	35 ^{±2} °C 48 h	Not operating
	Functional random vibration test	EN 50155:2017, clause 13.4.11.4 EN 61373:2010, clause 8, class B, body mounted ¹	Acceleration amplitude: Frequency band: Test duration:	0.1 g _n = 1.01 m/s ² 5 – 150 Hz 30 min (10 min in each axis)	Operating perf. crit. A
	Simulated long life testing	EN 50155:2017, clause 13.4.11.2 EN 61373:2010, clause 9, class B, body mounted ¹	Acceleration amplitude: Frequency band: Test duration:	0.58 g _n = 5.72 m/s ² 5 – 150 Hz 15 h (5 h in each axis)	Not operating
	Shock test	EN 50155:2017, clause 13.4.11.3 EN 61373:2010, clause 10, class B, body mounted ¹	Acceleration amplitude: Bump duration: Number of bumps:	5.1gn 30 ms 18 (3 in each direction)	Operating perf. crit. A
	Vibration sinusoidal	AREMA Part 11.5.1 class C, D, E, I, J	Acceleration amplitude: Frequency band: Test duration:	0.3" (5 – 20 Hz) 1.5 g _n = 14.7 m/s ² 10 – 200 Hz 12 h (4 h in each axis)	Operating perf. crit. A
	Mechanical shock	AREMA Part 11.5.1 class C, D, E, I, J	Acceleration amplitude: Bump duration: Number of bumps:	10 g _n = 98 m/s ² 11 ms 18 (3 in each direction)	Operating perf. crit. A

¹ Body mounted = chassis of a railway coach

EN 50155:2017 STANDARD						
Nominal Input	Permanent Input Range (0.7 - 1.25 Vin)	Brownout 100ms (0.6 x Vin)	Transient 1s (1.4 x Vin)			
24V	16.8V – 30V	14.4V	33.6V			
28V	19.6V – 35V	16.8V	39.2V			
36V	25.2V – 45V	21.6V	50.4V			
48V	33.6V – 60V	28.8V	67.2V			
72V	50.4V – 90V	43.2V	100.8V			
96V	67.2V – 120V	57.6V	134.4V			
110V	77V – 137.5V	66V	154V			



PRELIMINARY

IRV300 Series

300W 10:1 Ultra Wide Input Chassis-Mount Isolated DC-DC Converter

TECHNICAL NOTES

Output Voltage Adjustment

The output voltage can be adjusted higher (trimming-up) or lower (trimming-down) than the nominal voltage by connecting an external resistor across VO_UP and VO_ADJ or VO_DOWN and VO_ADJ at the control connector. Short-circuit VO_UP and VO_ADJ will set output voltage to maximum. Short-circuit VO_DOWN and VO_ADJ will set output voltage to minimum.

To adjust output voltage Vo higher than nominal voltage for IRV300-12: External resistor R_UP for trimming-up $R_UP = 0.4645(13.8-Vo)/(Vo-12) (k\Omega)$

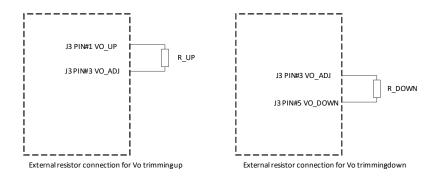
To adjust output voltage Vo lower than nominal voltage for IRV300-12: External resistor R_DOWN for trimming-down $R_DOWN = 1.3(Vo-11)/(12-Vo) (k\Omega)$

To adjust output voltage Vo higher than nominal voltage for IRV300-24: External resistor R_UP for trimming-up $R_UP = 0.2753(26.4-V0)/(Vo-24)$ (k Ω)

To adjust output voltage Vo lower than nominal voltage for IRV300-24: External resistor R_DOWN for trimming-down $R_DOWN = 2.61(Vo-21.6)/(24-Vo) (k\Omega)$

To adjust output voltage Vo higher than nominal voltage for IRV300-54: External resistor R_UP for trimming-up TBD To adjust output voltage Vo lower than nominal voltage for IRV300-54: External resistor R_DOWN for trimming-down TBD

Model	Trim Down	Trim Up
IRV300-12W80	Vout=11.0V	Vout=13.2V
	R_DOWN=0Ω	R_UP= 0.232kΩ
IRV300-24W80	Vout=21.6V	Vout=26.4V
	R_DOWN=0Ω	R_UP=0Ω
IRV300-54W80	Vout=48.0V	Vout=57.0V
	R_DOWN=TBD	R_UP=TBD



External resistor connection diagram for output voltage adjustment

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PRELIMINARY

IRV300 Series

Isolated DC-DC Converter

300W 10:1 Ultra Wide Input Chassis-Mount

Hold Up Option

Hold Up feature ensures the output uninterrupted for no less than 10mS at full load when the input voltage drops lower than 14.4V. When input voltage drops to lower than VIN_OFF (refer to PUL section) but is higher than 14.4V, a 100mS timer is set. If the input voltage doesn't recover to above VIN_ON in 100mS, the timer will be reset, the converter will shut down. If the input voltage drops lower than 14.4V, Hold Up circuit starts to work to keep the output uninterrupted. The converter will shut down if the output voltage starts to drop and cause the open-collector P_OK+ signal to be released (to open status) or the timer is reset.

PUL Specification and Recommended External Fuse

IRV300 Series PUL table and formula for PUL resistor selection and calculation of battery under voltage protection setup.

Battery	R_PUL	VIN_ON	VIN_OFF	External Fuse
24V	Not connected	16.4V	15.5V	25A fast, Littelfuse 0314025
36V	267k Ω	19.9V	17.9V	20A fast, Littelfuse 0314020
48V	82.5kΩ	28.7V	26.3V	15A fast, Littelfuse 0314015
72V	48.7kΩ	37.5V	33.6V	12A fast Littelfuse 0314012
96V	22k Ω	63.6V	57.5V	8A fast Schurter 8020.5077.G
110V	18.7kΩ	72.4V	65.3V	8A fast Schurter 8020.5077.G

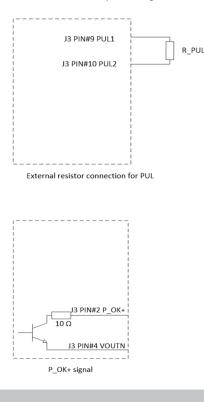
Input under voltage turn off could be setup by selecting PUL resistor given in the table above. The resistor value could also be calculated based on the preferred turn-off voltage that customers select for battery protection.

 $R_PUL = 953.62/(VIN_OFF-14.4)$

Where R_PUL is PUL resistor in kΩ, VIN_OFF is the turn-off voltage in Volt. Corresponding turn-on voltage VIN_ON is

 $VIN_{ON} = 15.95(R_{PUL}+66.23)/R_{PUL}$

When input voltage drops lower than VIN_OFF, the converter will continue operating 100mS before turning off the output. When input voltage drops lower than 14.4V, the converter enters input interruption mode. The hold-up circuit will keep the output uninterrupted for no less than 10mS under nominal load output. The converter will be shut down if input voltage is not recovered to above 16V afterward.



P OK+ Signal

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PRELIMINARY IRV

IRV300 Series

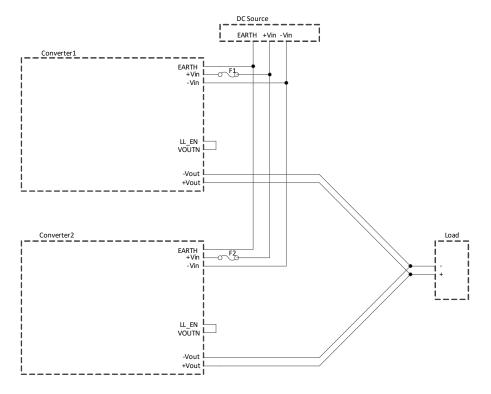
300W 10:1 Ultra Wide Input Chassis-Mount Isolated DC-DC Converter

ORing FET Option

ORing FET feature allows outputs of multiple units to be connected in parallel when high output power is required or when N+1 redundancy operation is required.

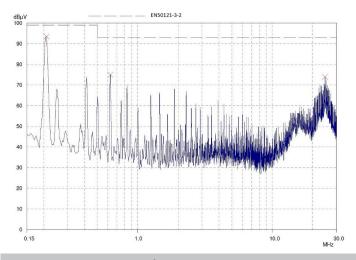
The units in parallel have passive current sharing. To put units in parallel operation, load line has to be enabled on each unit by connecting the LL_EN pin to VOUTN pin on the control connector. The output voltage will drop with the increase of output current by 10mV/A for 12V and 24V model, 100mV/A for 54V model.

The output power cables should have the same gauge and length for each unit from the output connector to the meeting points to the load to ensure balanced power output for each unit.

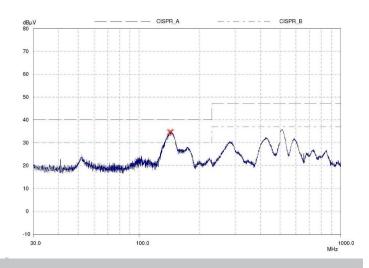




Conducted Emission Test, (110Vin, 12V @ 24A out)

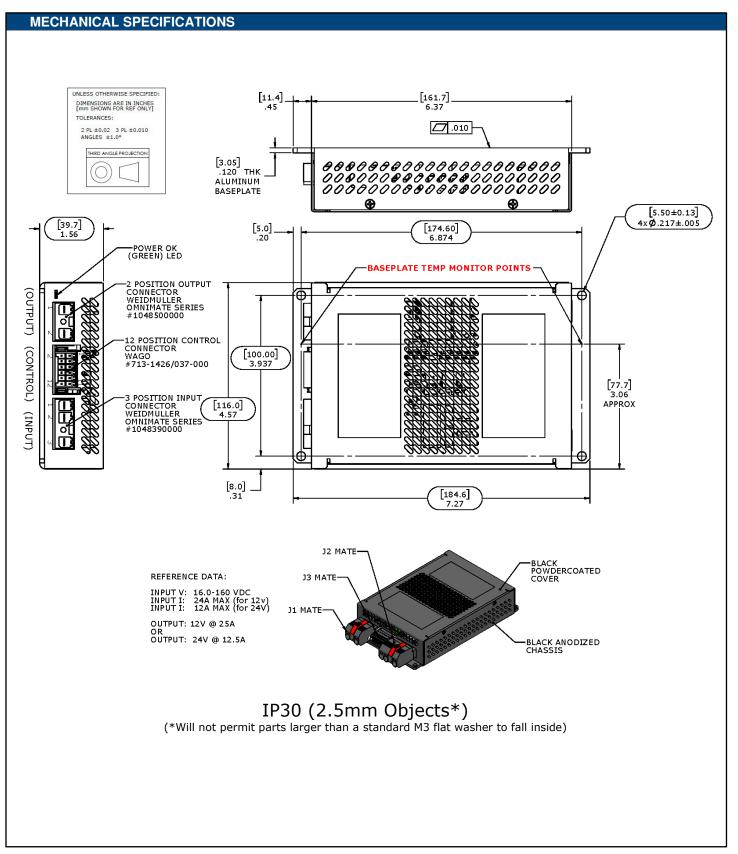


Radiated Emission Test, (110Vin, 12V @ 24A out)



IRV300 Series

300W 10:1 Ultra Wide Input Chassis-Mount Isolated DC-DC Converter



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PIN FUNCTION & DESCRIPTION (J3 CONTROL)

PIN 1: VO_UP, for output voltage adjustment. When a resistor is connected between VO_UP and VO_ADJ (PIN 3), the output voltage will be set to a value that is higher than nominal voltage (12V for IRV300-12, 24V for IRV300-24). When the connected resistor is zero (short-circuiting PIN 1 and PIN 3), the output voltage is set to maximum (13.8V for IRV300-12, 26.4V for IRV300-24 and 57V for IRV300-54).

PIN 2: P_OK_+ , open collector output . When the output voltage is higher than 10.5V for IRV300-12 (20.5V for IRV300-24 and 43.8V for IRV300-54), the voltage between P_OK_+ (PIN 2) and VOutN (PIN 4) is pull down to less than 0.8V.

PIN 3: VO_ADJ, for output voltage adjustment. Used with PIN 1 or PIN 5 to set the output voltage higher or lower than nominal voltage.

PIN 4: VOUTN, used with P_OK+ (PIN 2) for output voltage status. This pin is internally connected to the negative terminal of the output connector.

PIN 5: VO_DOWN, for output voltage adjustment. When a resistor is connected between VO_DOWN and VO_ADJ (PIN3), the output voltage will be set to a value that is lower than nominal voltage. When the connected resistor is zero (short-circuiting PIN5 and PIN3), the output voltage is set to minimum (11 for IRV300-12, 21.6V for IRV300-24, 47V for IRV300-54).

PIN 6: LL_EN, for units with output ORing feature. Connect this pin to VOUTN (PIN 4) will enable output voltage droop with the increase of load current. This pin must be connected to VOUTN (PIN 4) before connecting outputs in parallel and enabling the ORing function.

PIN 7: and PIN 8: No connection

PIN 9: PUL1 and **PIN 10: PUL2**, for Programmable Under voltage Lockout (PUL).

PIN 11: ON/OFF+, for output inhibit. Output is OFF when this pin is pull down to lower than 0.8V with reference to VINN (PIN 12). For output ON state, leave this pin open or connect and keep its voltage higher than 4V.

PIN 12: VINN, this pin is internally connected to the negative terminal of the input connector.

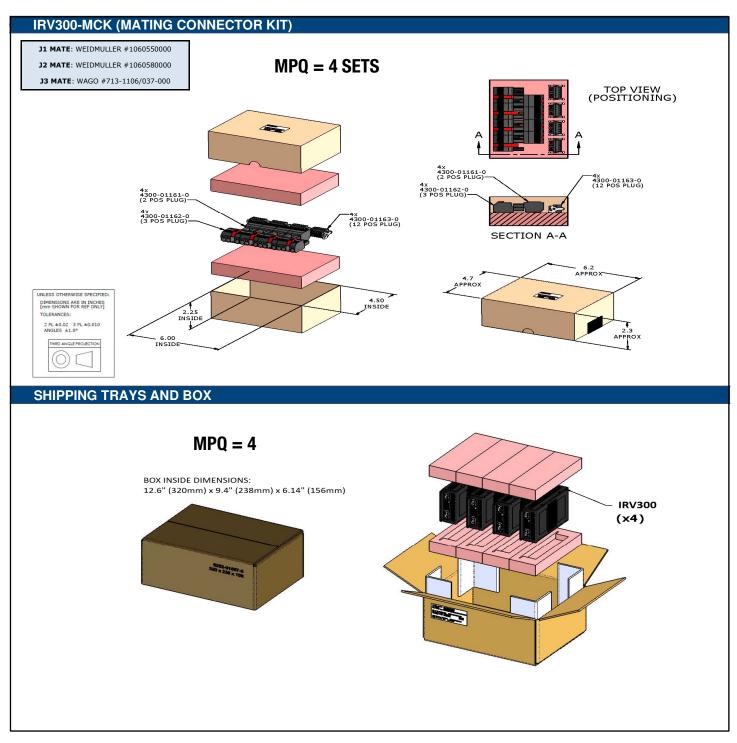
J1 OUTPUT		
PIN #	PIN # FUNCTION	
1	+Vout	
2	-Vout	

J2 INPUT	
PIN #	FUNCTION
1	-Vin
2	+Vin
3	GND

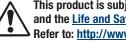
J3 CONTROL		
PIN #	FUNCTION	
1	VO_UP	
2	P_0K+	
3	VO_ADJ	
4	VOUTN	
5	VO_DOWN	
6	LL_EN	
7	No Connection	
8	No Connection	
9	PUL1	
10	PUL2	
11	ON/OFF+	
12	VINN	

IRV300 Series

300W 10:1 Ultra Wide Input Chassis-Mount Isolated DC-DC Converter



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