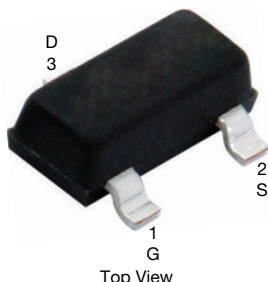


P-Channel 30 V (D-S) MOSFET

SOT-23 (TO-236)



Top View

Marking code: G6

PRODUCT SUMMARY

V_{DS} (V)	-30
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.0227
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5$ V	0.0330
Q_g typ. (nC)	8.2
I_D (A) ^{a, e}	-7.5
Configuration	Single

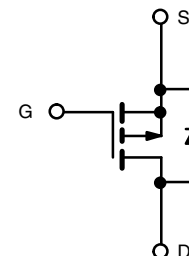
FEATURES

- TrenchFET® Gen IV p-channel power MOSFET
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912


RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load switch
- Circuit protection
- Motor drive control



P-Channel MOSFET

ORDERING INFORMATION

Package	SOT-23
Lead (Pb)-free and halogen-free	Si2393DS-T1-GE3
Alternate manufacturing location	Si2393DS-T1-BE3

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	-30	V
Gate-source voltage	V_{GS}	-20 / +16	
Continuous drain current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	-7.5 ^e
		$T_C = 70$ °C	-6.9
		$T_A = 25$ °C	-6.1 ^{b, c}
		$T_A = 70$ °C	-4.8 ^{b, c}
Pulsed drain current ($t = 100$ μ s)	I_{DM}	-50	A
Continuous source-drain diode current	I_S	$T_C = 25$ °C	-2.1
		$T_A = 25$ °C	-1.1 ^{b, c}
Maximum power dissipation	P_D	$T_C = 25$ °C	2.5
		$T_C = 70$ °C	1.6
		$T_A = 25$ °C	1.3 ^{b, c}
		$T_A = 70$ °C	0.8 ^{b, c}
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^b	R_{thJA}	75	100	°C/W
Maximum junction-to-case (drain)	R_{thJF}	40	50	

Notes

- Based on $T_C = 25$ °C
- Surface mounted on 1" x 1" FR4 board
- $t = 5$ s
- Maximum under steady state conditions is 166 °C/W
- Package limited

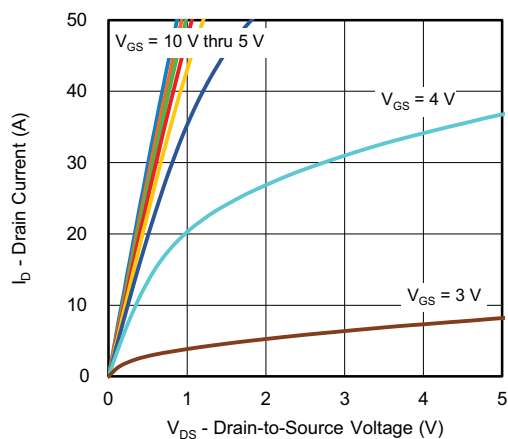
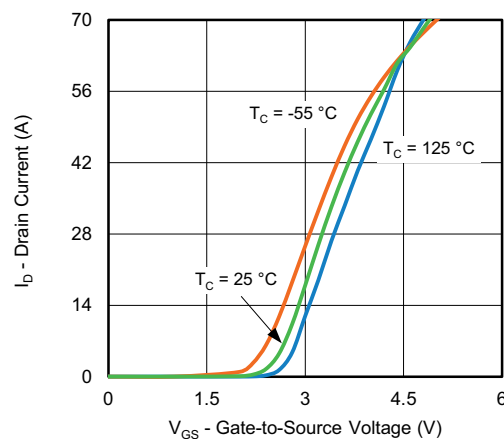
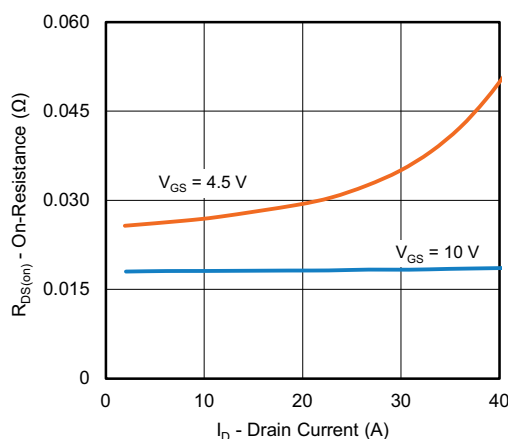
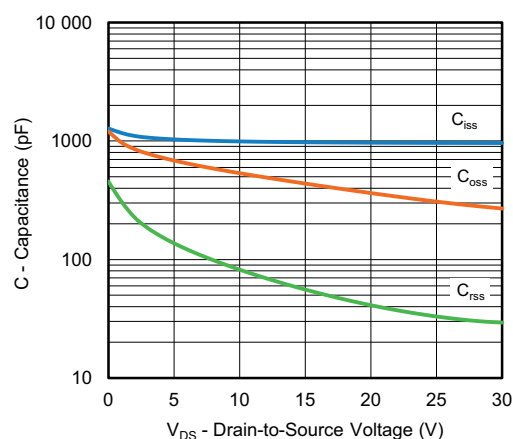
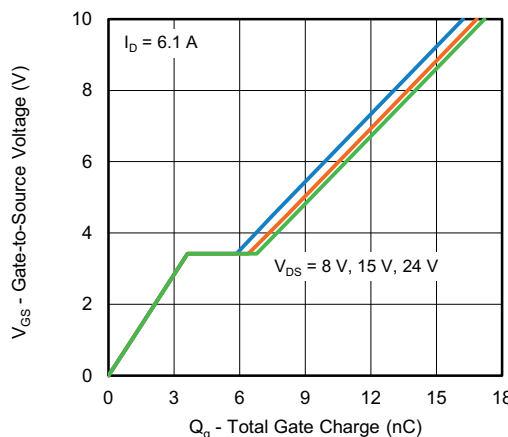
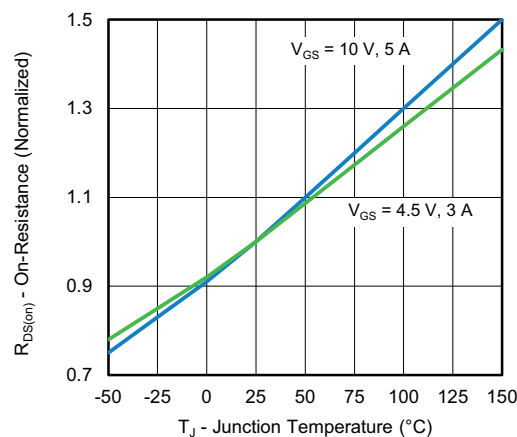


SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = -250 μA	-30	-	-	V
V _{DS} temperature coefficient	ΔV _{DS} /T _J	I _D = -250 μA	-	-24.7	-	mV/°C
V _{GS(th)} temperature coefficient	ΔV _{GS(th)} /T _J	I _D = -250 μA	-	5.7	-	
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	-1	-	-2.2	V
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = -20 V / +16 V	-	-	100	nA
Zero gate voltage drain current	I _{DSS}	V _{DS} = -30 V, V _{GS} = 0 V	-	-	-1	μA
		V _{DS} = -30 V, V _{GS} = 0 V, T _J = 70 °C	-	-	-15	
On-state drain current ^a	I _{D(on)}	V _{DS} ≥ -10 V, V _{GS} = -10 V	-10	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = -10 V, I _D = -5 A	-	0.0189	0.0227	Ω
		V _{GS} = -4.5 V, I _D = -3 A	-	0.0264	0.0330	
Forward transconductance ^a	g _{fs}	V _{DS} = -15 V, I _D = -5 A	-	10	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{DS} = -15 V, V _{GS} = 0 V, f = 1 MHz	-	980	-	pF
Output capacitance	C _{oss}		-	440	-	
Reverse transfer capacitance	C _{rss}		-	55	-	
Total gate charge	Q _g	V _{DS} = -15 V, V _{GS} = -10 V, I _D = -6.1 A	-	16.8	25.2	nC
		V _{DS} = -15 V, V _{GS} = -4.5 V, I _D = -6.1 A	-	8.2	12.3	
Q _{gs}	-		3.6	-		
Q _{gd}	-		2.8	-		
Gate resistance	R _g	f = 1 MHz	3.6	18.3	36.6	Ω
Turn-on delay time	t _{d(on)}	V _{DD} = -15 V, R _L = 2.5 Ω, I _D ≅ -4.8 A, V _{GEN} = -10 V, R _g = 1 Ω	-	14	28	ns
Rise time	t _r		-	8	16	
Turn-off delay time	t _{d(off)}		-	48	96	
Fall time	t _f		-	32	64	
Turn-on delay time	t _{d(on)}	V _{DD} = -15 V, R _L = 2.5 Ω, I _D ≅ -4.8 A, V _{GEN} = -4.5 V, R _g = 1 Ω	-	30	45	
Rise time	t _r		-	85	170	
Turn-off delay time	t _{d(off)}		-	34	68	
Fall time	t _f		-	40	80	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I _S	T _C = 25 °C	-	-	-2.1	A
Pulse diode forward current	I _{SM}		-	-	-50	
Body diode voltage	V _{SD}	I _S = -4.8 A, V _{GS} = 0 V	-	-0.8	-1.2	V
Body diode reverse recovery time	t _{rr}	I _F = -4.8 A, di/dt = 100 A/μs, T _J = 25 °C	-	21	42	ns
Body diode reverse recovery charge	Q _{rr}		-	8	16	nC
Reverse recovery fall time	t _a		-	8.5	-	ns
Reverse recovery rise time	t _b		-	12.5	-	

Notes

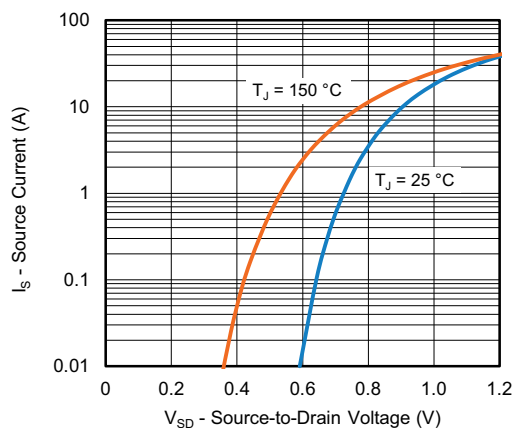
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
b. Guaranteed by design, not subject to production testing

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

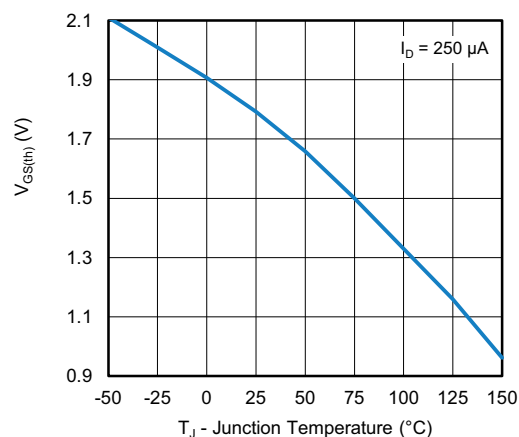
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current and Gate Voltage

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature



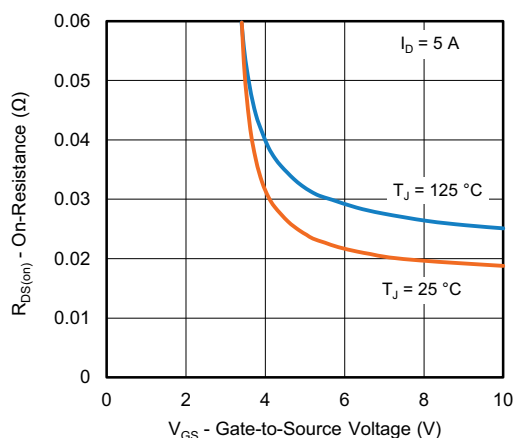
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



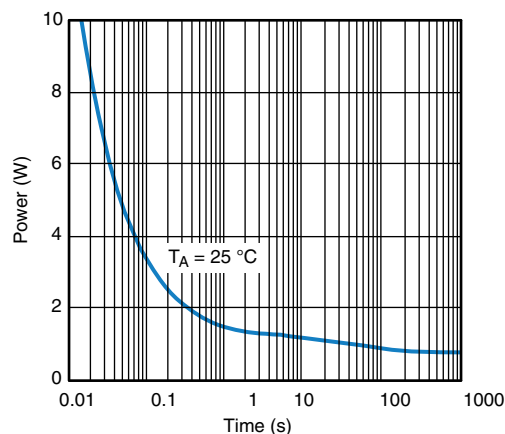
Source-Drain Diode Forward Voltage



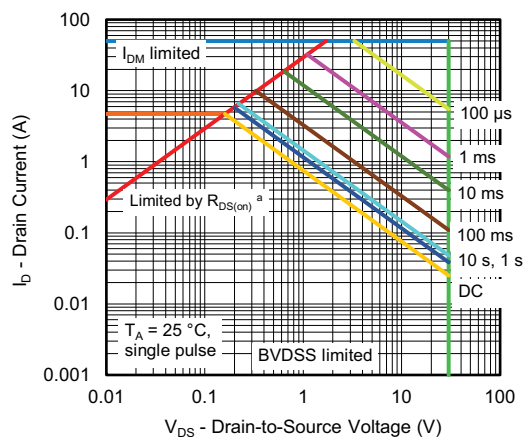
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



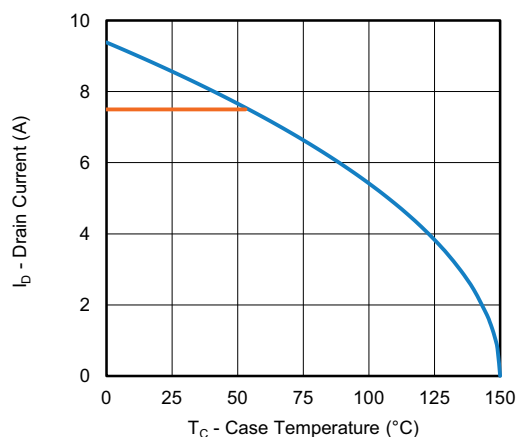
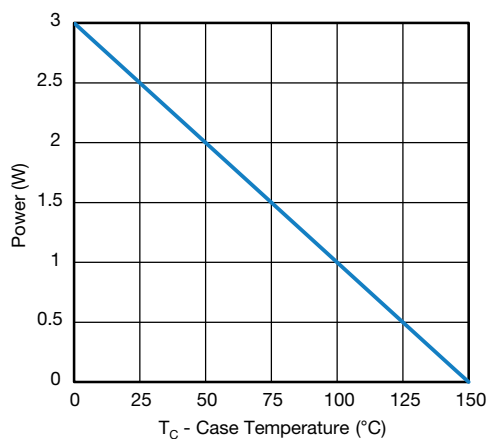
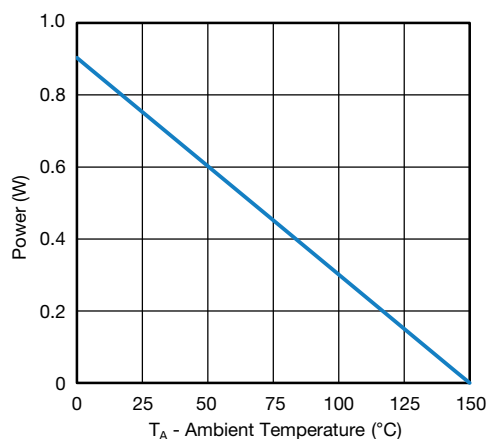
Single Pulse Power, Junction-to-Ambient



Safe Operating Area, Junction-to-Ambient

Note

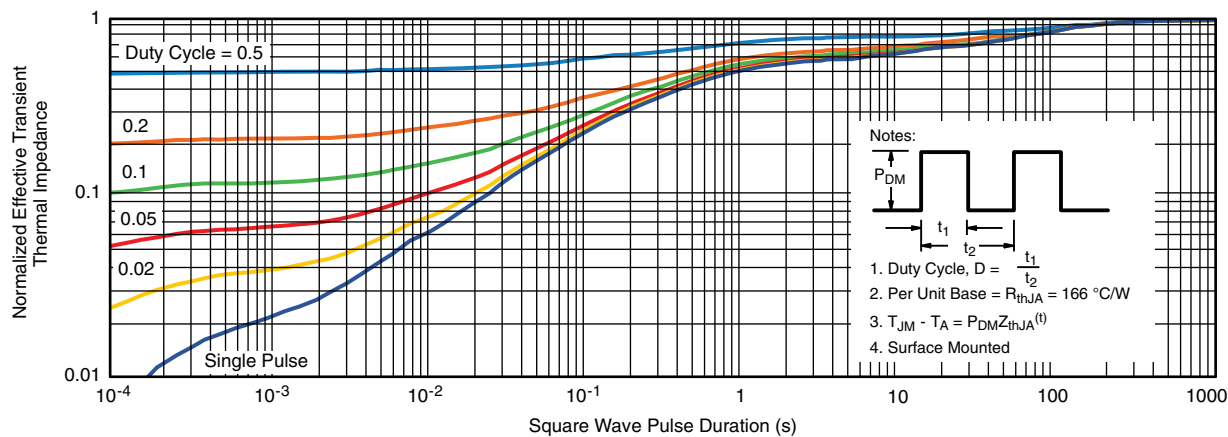
a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Current Derating ^a

Power, Junction-to-Case

Power, Junction-to-Ambient
Note

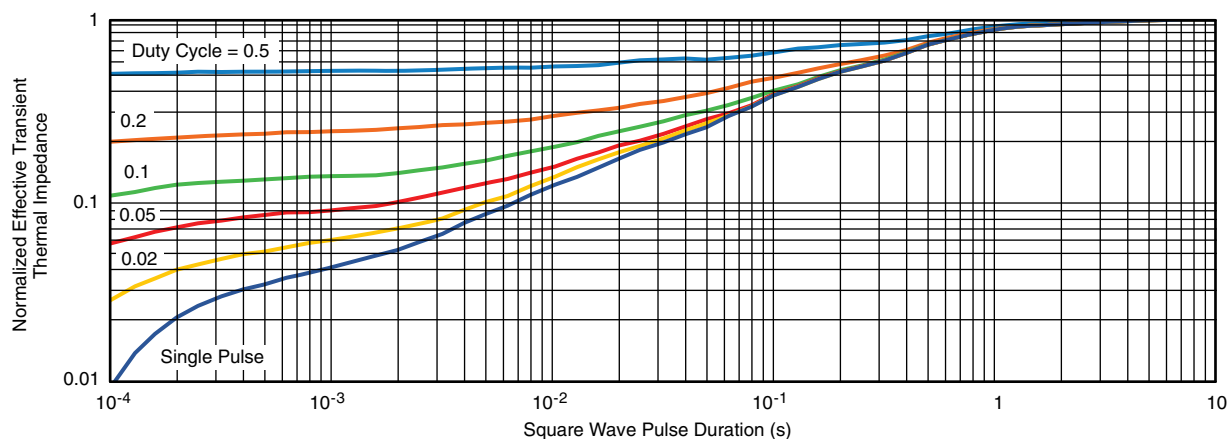
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

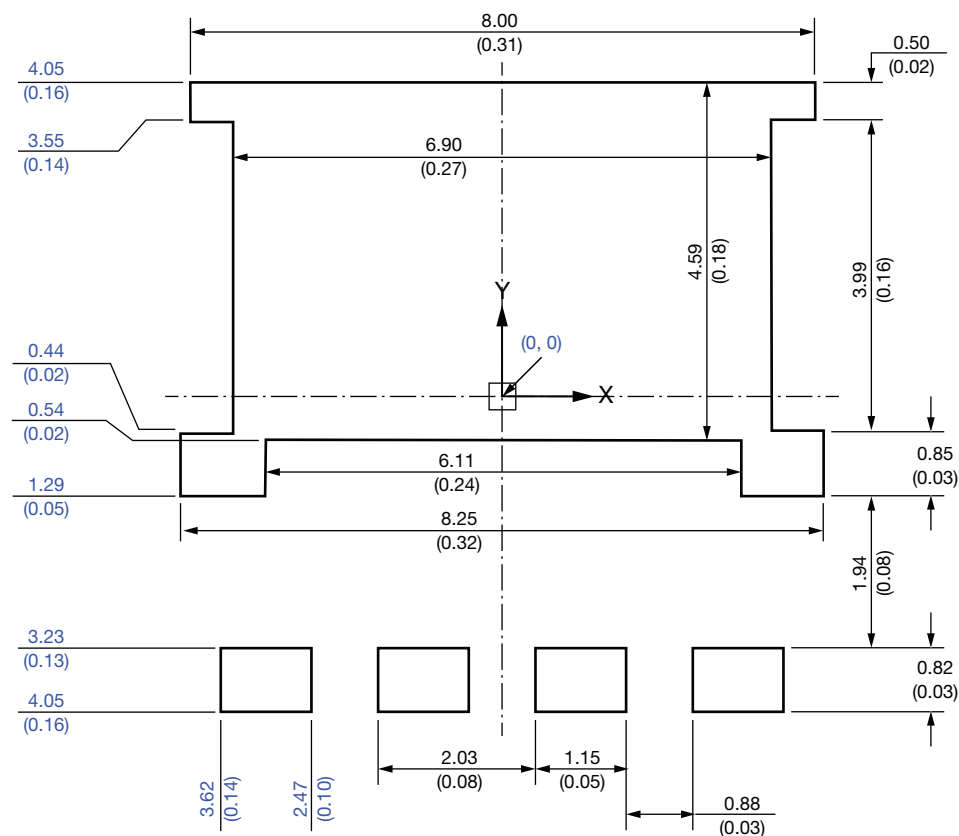
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SOT-23 (TO-236): 3-LEAD



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A ₁	0.01	0.10	0.0004	0.004
A ₂	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E ₁	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e ₁	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L ₁	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°
ECN: S-03946-Rev. K, 09-Jul-01				
DWG: 5479				

Recommended Minimum PADS for PowerPAK® 8 x 8L Single



Dimensions in millimeters (inches)

Note

- Linear dimensions are in black, the same information is provided in ordinate dimensions which are in blue.



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