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FDP2D3N10C / FDPF2D3N10C

N-Channel Shielded Gate PowerTrench® MOSFET

100 V, 222 A, 2.3 mΩ

Features

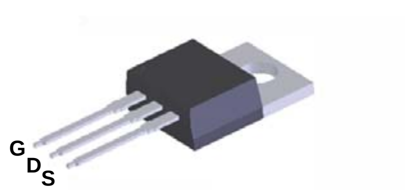
- Max $r_{DS(on)}$ = 2.3 mΩ at V_{GS} = 10 V, I_D = 100 A
- Extremely Low Reverse Recovery Charge, Qrr
- 100% UIL Tested
- RoHS Compliant

General Description

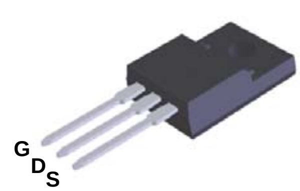
This N-Channel MV MOSFET is produced using ON Semiconductor's advanced PowerTrench® process that incorporates Shielded Gate technology. This process has been optimized to minimize on-state resistance and yet maintain superior switching performance with best in class soft body diode.

Applications

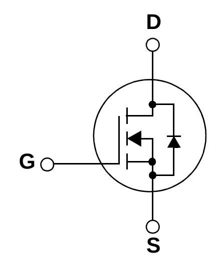
- Synchronous Rectification for ATX / Server / Telecom PSU
- Motor drives and Uninterruptible Power Supplies
- Micro Solar Inverter



TO-220



TO-220F



MOSFET Maximum Ratings T_C = 25 °C unless otherwise noted.

Symbol	Parameter	Ratings		Units
		FDP2D3N10C	FDPF2D3N10C	
V_{DS}	Drain to Source Voltage	100	100	V
V_{GS}	Gate to Source Voltage	±20	±20	V
I_D	Drain Current -Continuous T_C = 25°C (Note 3)	222*	222*	A
	-Continuous T_C = 100°C (Note 3)	157*	157*	
	-Pulsed (Note 1)	888	888	
E_{AS}	Single Pulse Avalanche Energy (Note 2)	1176		mJ
P_D	Power Dissipation T_C = 25°C	214	45	W
	Power Dissipation T_A = 25°C	2.4	2.4	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +175		°C

* Drain current limited by maximum junction temperature. Package limitation current is 120A.

Thermal Characteristics

Symbol	Parameter	FDP2D3N10C	FDPF2D3N10C	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.7	3.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	62.5	

Package Marking and Ordering Information

Device Marking	Device	Package	Packing Method	Quantity
FDP2D3N10C	FDP2D3N10C	TO-220	Tube	50 units
FDPF2D3N10C	FDPF2D3N10C	TO-220F	Tube	50 units

Electrical Characteristics T_J = 25 °C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		70		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80 V, V_{GS} = 0 V			1	μA
		V_{DS} = 80 V, T_J= 150°C			500	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 700 μA	2.0	3.0	4.0	V
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 100 A		2.1	2.3	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 100 A		222		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		7980	11180	pF
C_{oss}	Output Capacitance			4490	6290	pF
C_{rss}	Reverse Transfer Capacitance			40	75	pF
R_g	Gate Resistance		0.1	0.8	1.8	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50 V, I_D = 100 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		42	67	ns
t_r	Rise Time			35	56	ns
$t_{d(off)}$	Turn-Off Delay Time			74	118	ns
t_f	Fall Time			32	57	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 50 V, I_D = 100 A		108	152	nC
Q_{gs}	Gate to Source Gate Charge			36		nC
Q_{gd}	Gate to Drain “Miller” Charge			22		nC
Q_{oss}	Output Charge	V_{DD} = 50 V, V_{GS} = 0 V		297		nC
Drain-Source Diode Characteristic						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	222	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	888	A
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 100 A		0.9	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, V_{DD} = 50 V, I_F = 100 A, dI_F/dt = 100 A/μs		107	172	ns
Q_{rr}	Reverse Recovery Charge			191	306	nC
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, V_{DD} = 50 V, I_F = 100 A, dI_F/dt = 300 A/μs		97	155	ns
Q_{rr}	Reverse Recovery Charge			492	788	nC

Notes**:**

1. Pulsed Id please refer to Figure.11 and Figure.12 “Forward Bias Safe Operating Area” for more details.
2. E_{AS} of 1176 mJ is based on starting T_J = 25 °C, L = 3 mH, I_{AS} = 28 A, V_{DD} = 90 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 89 A.
3. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

Typical Characteristics T_J = 25 °C unless otherwise noted.

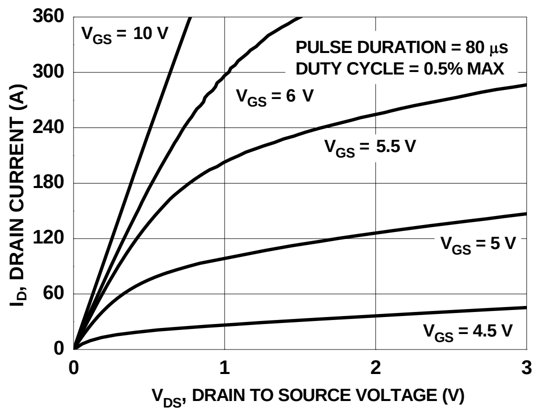


Figure 1. On-Region Characteristics

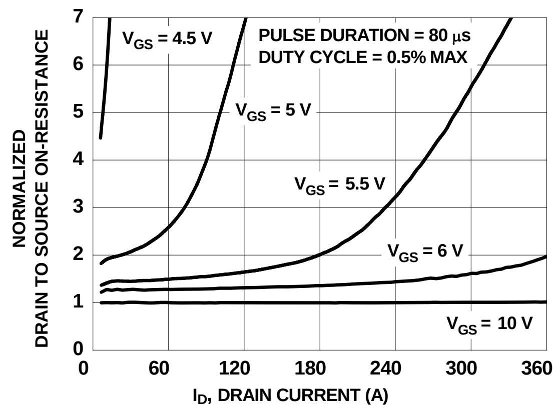


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

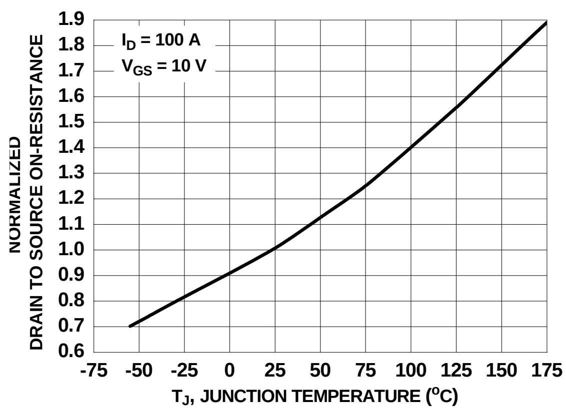


Figure 3. Normalized On-Resistance vs. Junction Temperature

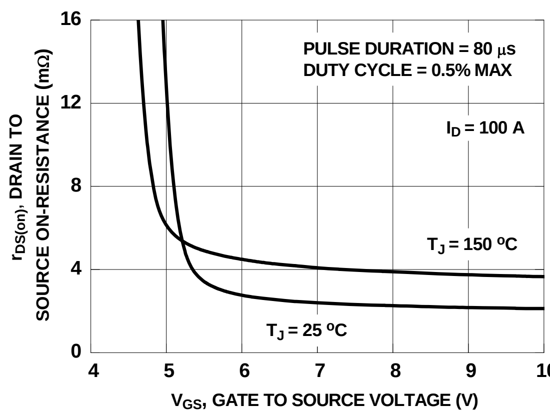


Figure 4. On-Resistance vs. Gate to Source Voltage

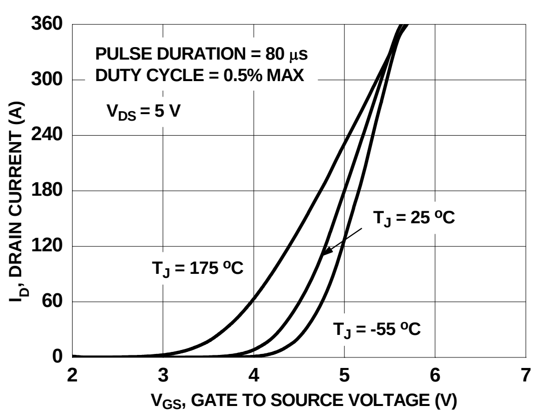


Figure 5. Transfer Characteristics

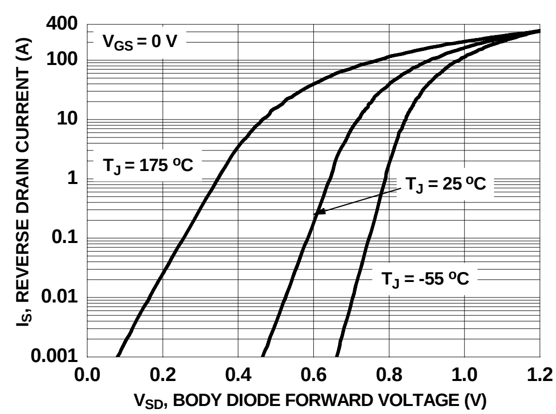


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted.

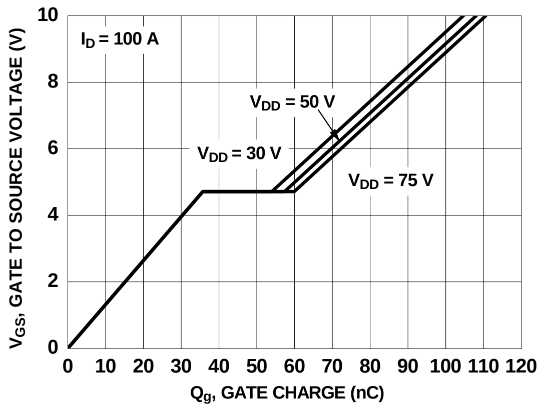


Figure 7. Gate Charge Characteristics

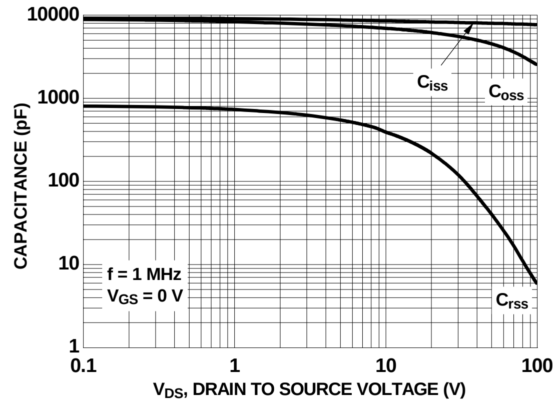


Figure 8. Capacitance vs. Drain to Source Voltage

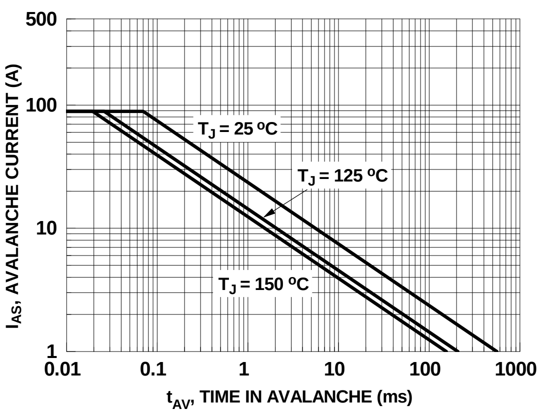


Figure 9. Unclamped Inductive Switching Capability

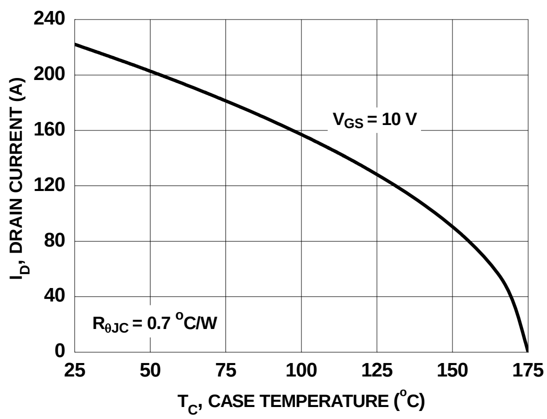


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

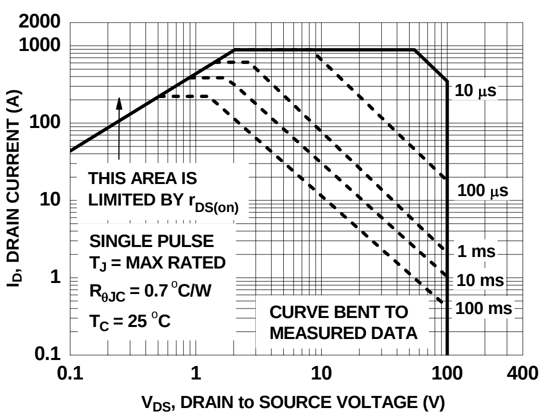


Figure 11. Forward Bias Safe Operating Area for FDP2D3N10C

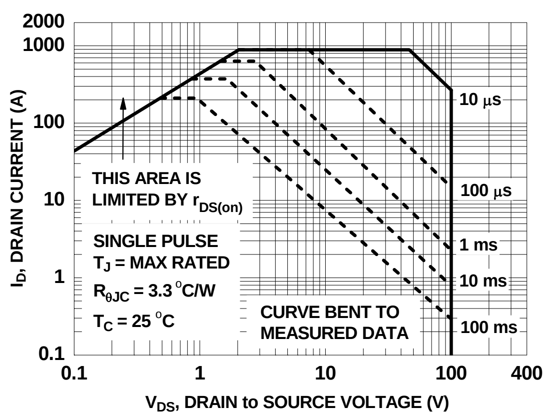


Figure 12. Forward Bias Safe Operating Area for FDPF2D3N10C

Typical Characteristics T_J = 25 °C unless otherwise noted.

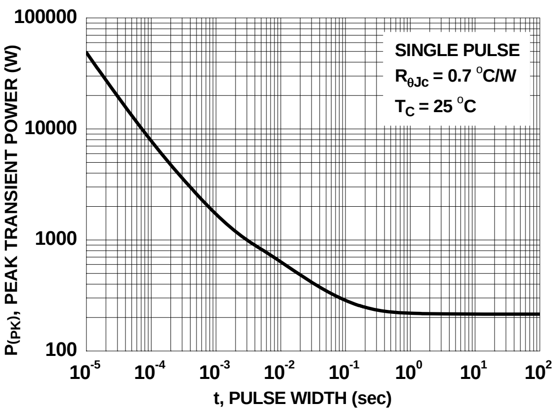


Figure 13. Single Pulse Maximum Power Dissipation for FDP2D3N10C

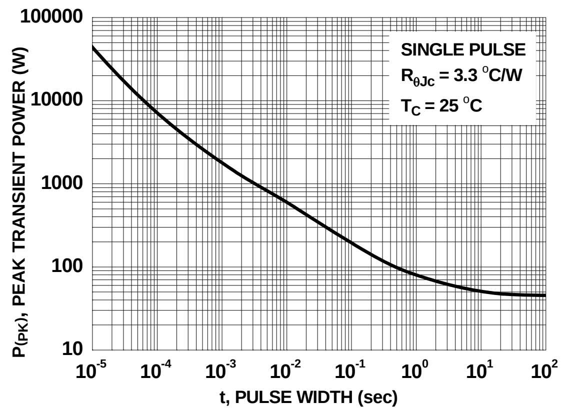


Figure 14. Single Pulse Maximum Power Dissipation for FDPF2D3N10C

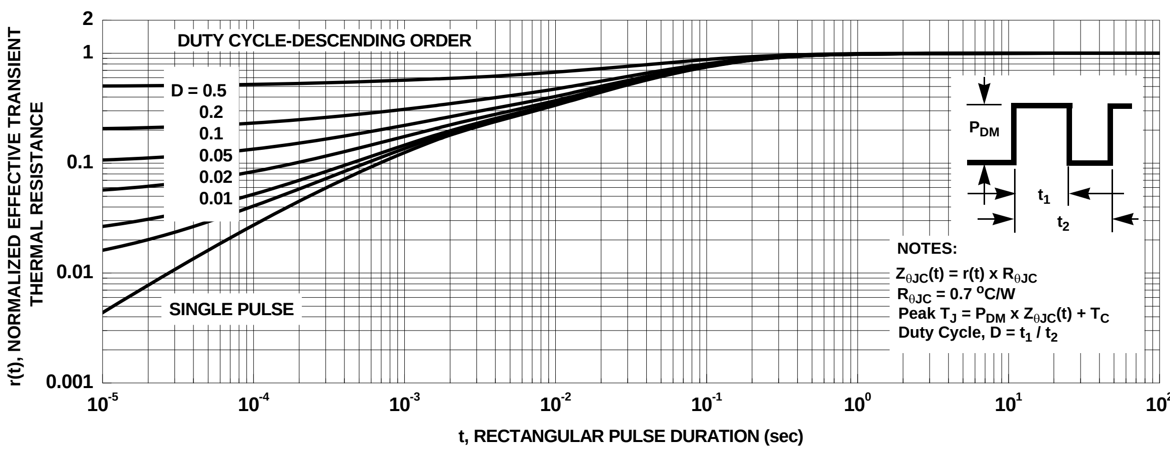


Figure 15. Junction-to-Case Transient Thermal Response Curve for FDP2D3N10C

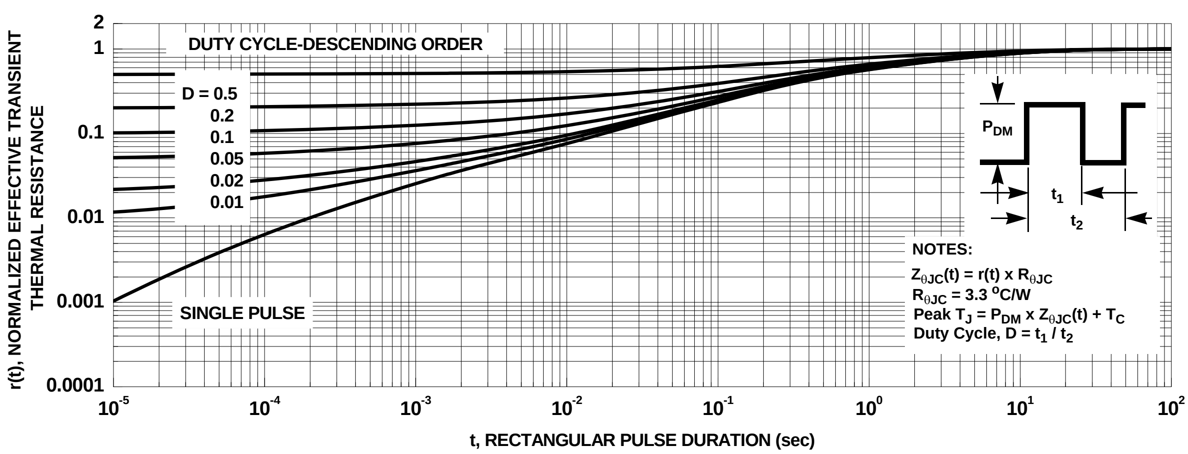
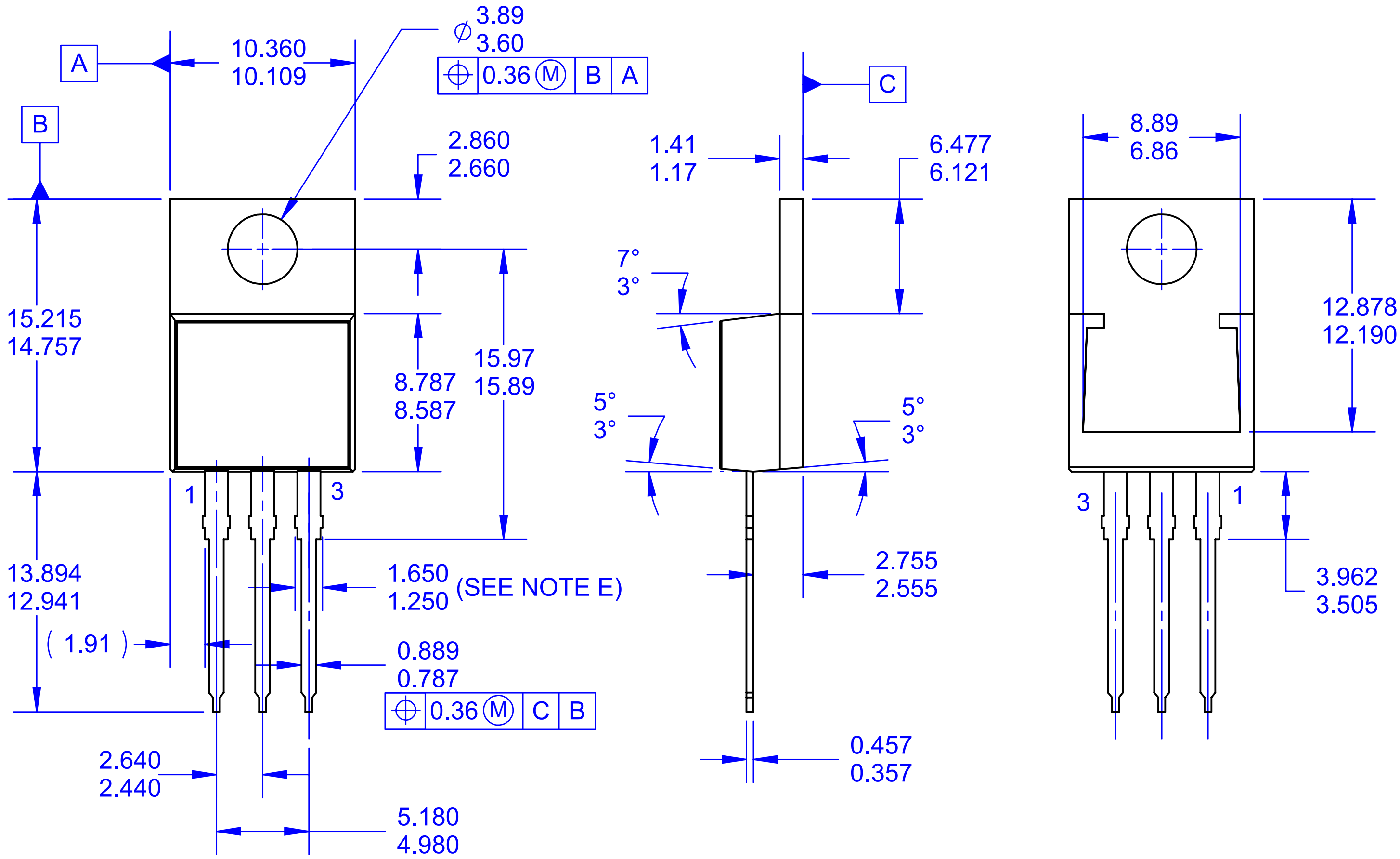
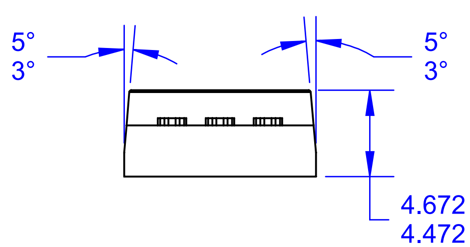


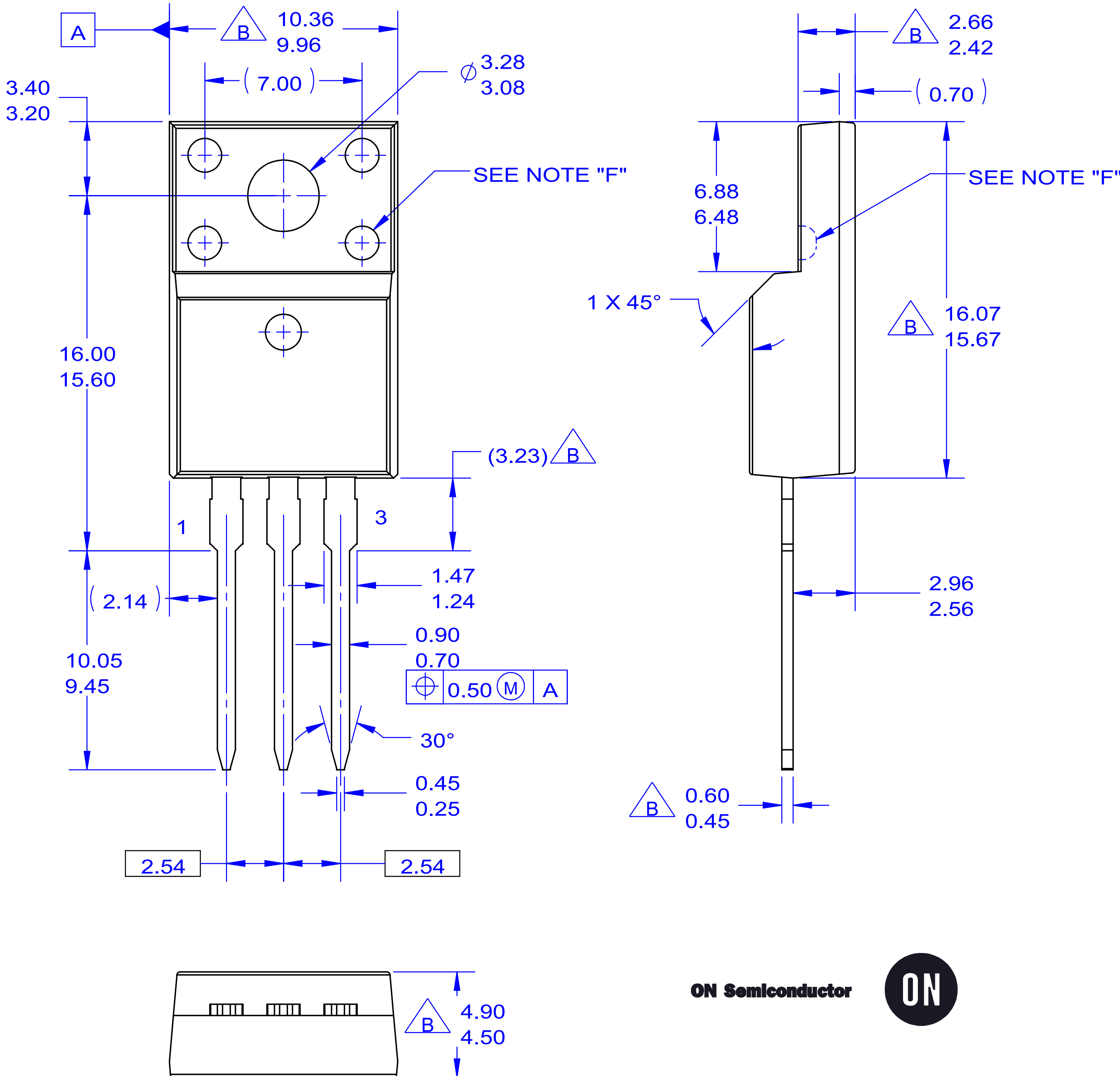
Figure 16. Junction-to-Case Transient Thermal Response Curve for FDPF2D3N10C





NOTES:

A. PACKAGE REFERENCE: JEDEC TO220
VARIATION AB
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSION AND TOLERANCE AS PER ASME
Y14.5-2009.
D. DIMENSIONS ARE EXCLUSIVE OF BURRS,
MOLD FLASH AND TIE BAR PROTRUSIONS.
E. MAX WIDTH FOR F102 DEVICE = 1.35mm.
F. DRAWING FILE NAME: TO220T03REV4.
G. FAIRCHILD SEMICONDUCTOR.



NOTES:

A. EXCEPT WHERE NOTED CONFORMS TO EIAJ SC91A.
B. DOES NOT COMPLY EIAJ STD. VALUE.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
E. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
F. OPTION 1 - WITH SUPPORT PIN HOLE.
OPTION 2 - NO SUPPORT PIN HOLE.
G. DRAWING FILE NAME: TO220M03REV5

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