

FDD850N10L

N-Channel PowerTrench® MOSFET

100V, 15.7A, 75mΩ

Features

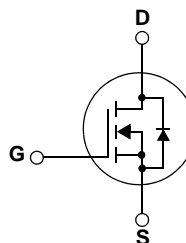
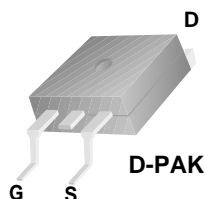
- $R_{DS(on)} = 61m\Omega$ (Typ.) @ $V_{GS} = 10V$, $I_D = 12A$
- $R_{DS(on)} = 64m\Omega$ (Typ.) @ $V_{GS} = 5V$, $I_D = 12A$
- Low Gate Charge (Typ. 22.2nC)
- Low C_{rss} (Typ. 42pF)
- Fast Switching
- 100% Avalanche Tested
- Improve dv/dt Capability
- RoHS Compliant

Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advance PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Application

- DC to DC Converters / Synchronous Rectification



MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted*

Symbol	Parameter	Rating	Units
V_{DSS}	Drain to Source Voltage	100	V
V_{GSS}	Gate to Source Voltage	± 20	V
I_D	Drain Current	- Continuous ($T_C = 25^\circ\text{C}$)	A
		- Continuous ($T_C = 100^\circ\text{C}$)	
I_{DM}	Drain Current	- Pulsed (Note 1)	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	V/ns
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	W
		- Derate above 25°C	$W/^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Min.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	-	3.0	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	87	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD850N10L	FDD850N10L	D-PAK	380mm	16mm	2500

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	100	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, Referenced to 25°C	-	0.1	-	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 80\text{V}$, $V_{GS} = 0\text{V}$	-	-	1	μA
		$V_{DS} = 80\text{V}$, $T_C = 150^\circ\text{C}$	-	-	500	
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$	1.0	-	2.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}$, $I_D = 12\text{A}$	-	61	75	$\text{m}\Omega$
		$V_{GS} = 5\text{V}$, $I_D = 12\text{A}$	-	64	96	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{V}$, $I_D = 15.7\text{A}$ (Note 4)	-	31	-	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$	-	1100	1465	pF
C_{oss}	Output Capacitance		-	80	105	pF
C_{rss}	Reverse Transfer Capacitance		-	42	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	$V_{GS} = 10\text{V}$	-	22.2	28.9	nC
$Q_{g(tot)}$	Total Gate Charge at 5V	$V_{GS} = 5\text{V}$	-	12.3	16.0	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DS} = 80\text{V}$ $I_D = 15.7\text{A}$	-	3.0	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	5.7	-	nC

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\text{V}$, $I_D = 15.7\text{A}$ $V_{GS} = 5\text{V}$, $R_{GEN} = 4.7\Omega$ (Note 4, 5)	-	17	44	ns
t_r	Turn-On Rise Time		-	21	52	ns
$t_{d(off)}$	Turn-Off Delay Time		-	27	64	ns
t_f	Turn-Off Fall Time		-	8	26	ns
ESR	Equivalent Series Resistance (G-S)		-	1.75	-	Ω

Drain-Source Diode Characteristics

I _S	Maximum Continuous Drain to Source Diode Forward Current	-	-	15.7	A	
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current	-	-	63	A	
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _{SD} = 12A	-	-	1.3	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, V _{DS} = 80V, I _{SD} = 15.7A	-	38	-	ns
Q _{rr}	Reverse Recovery Charge	dI _F /dt = 100A/μs (Note 4)	-	50	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 1\text{mH}$, $I_{AS} = 9.1\text{A}$, $R_C = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 15.7\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Dual Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

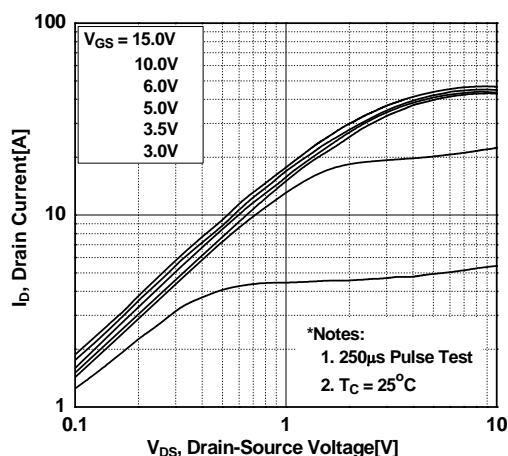


Figure 2. Transfer Characteristics

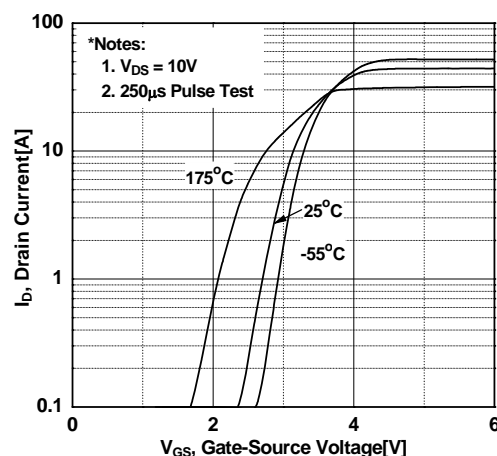


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

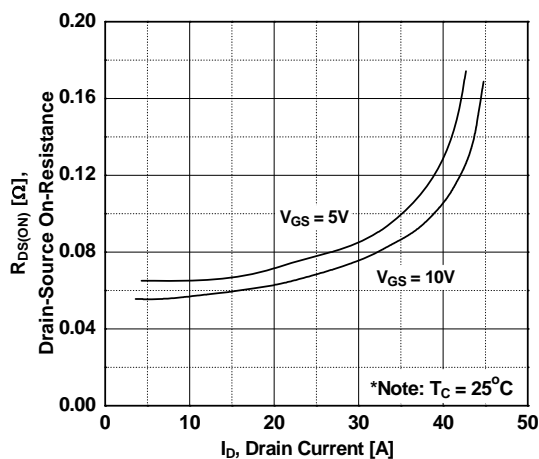


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

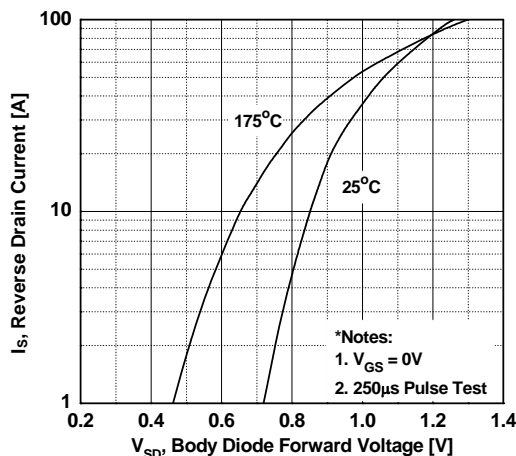


Figure 5. Capacitance Characteristics

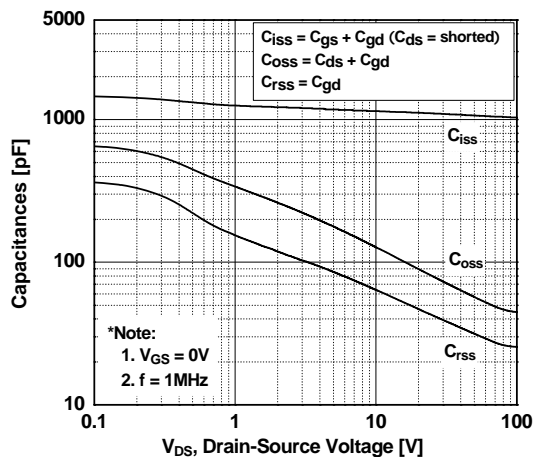
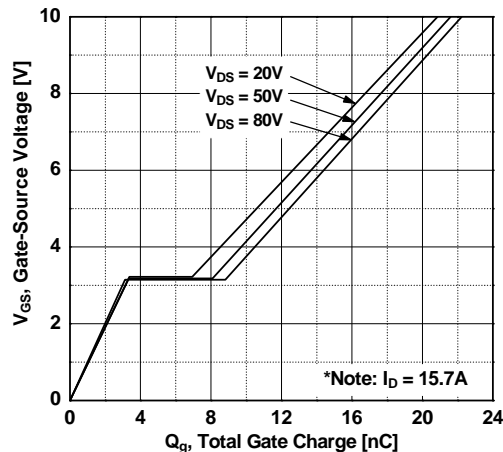


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

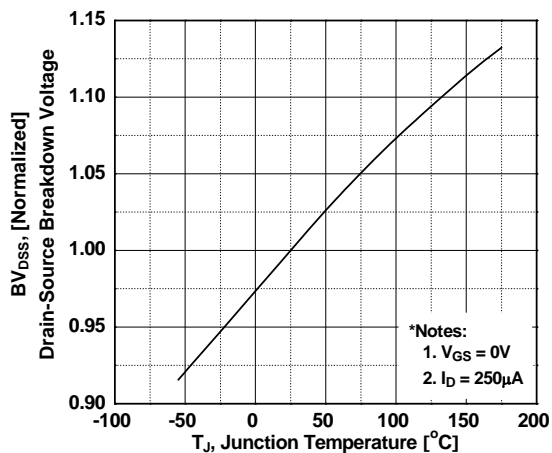


Figure 8. On-Resistance Variation vs. Temperature

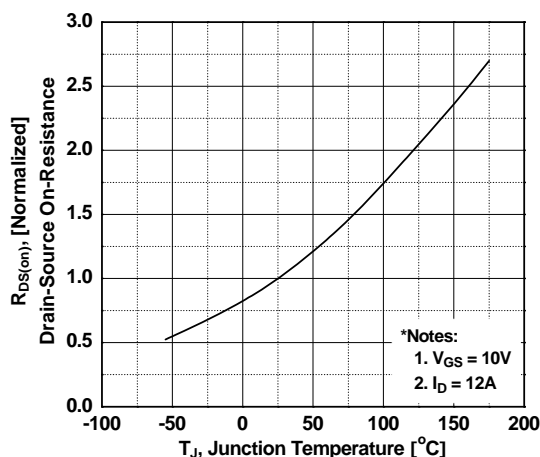


Figure 9. Maximum Safe Operating Area vs. Case Temperature

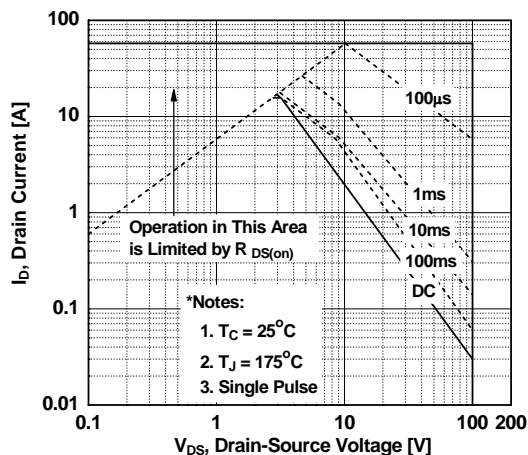


Figure 10. Maximum Drain Current

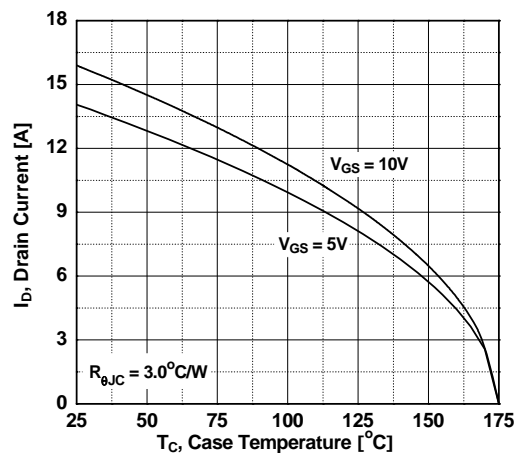
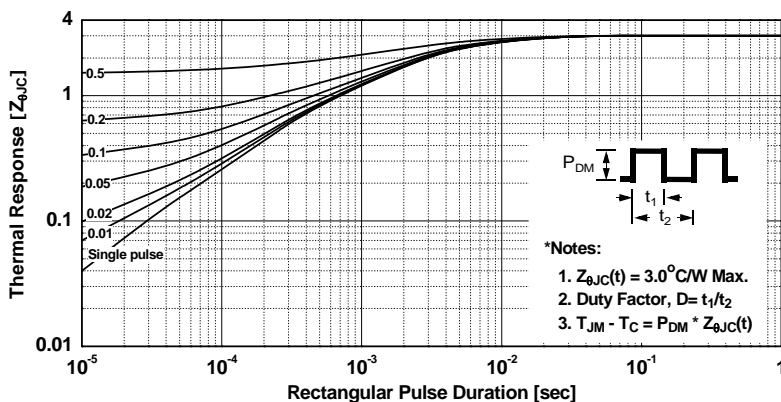
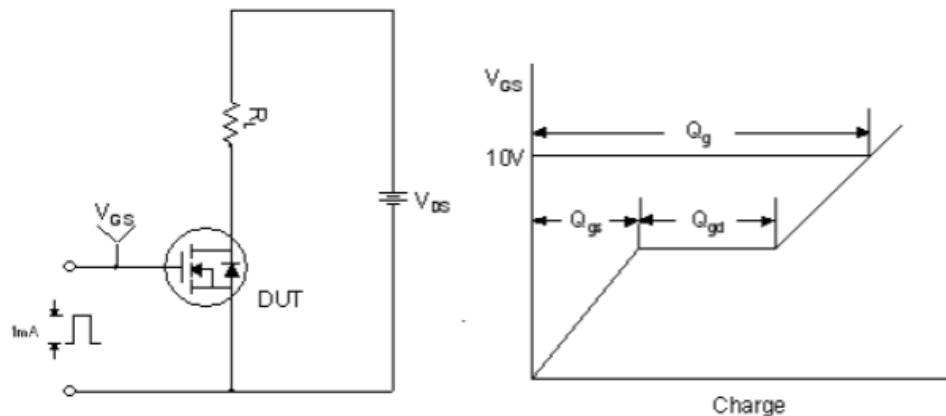


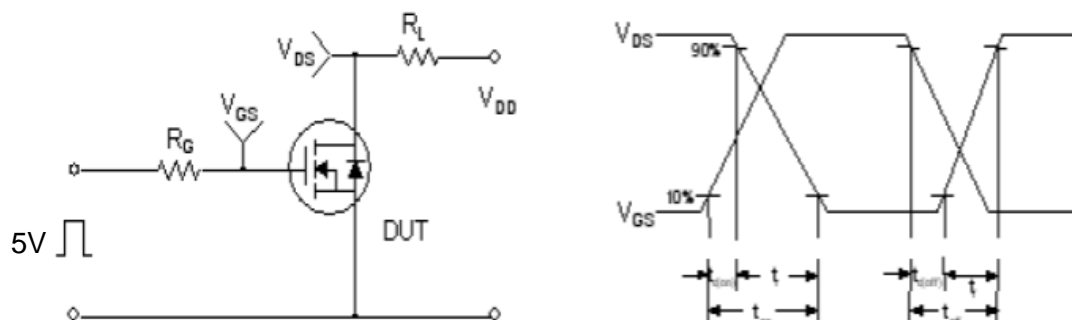
Figure 11. Transient Thermal Response Curve



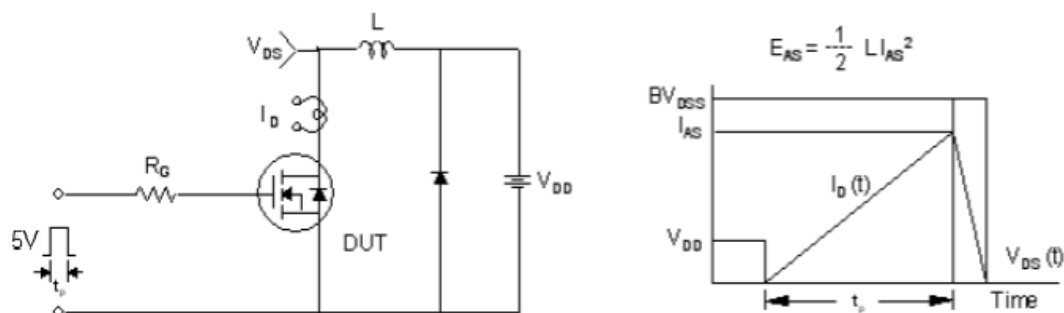
Gate Charge Test Circuit & Waveform



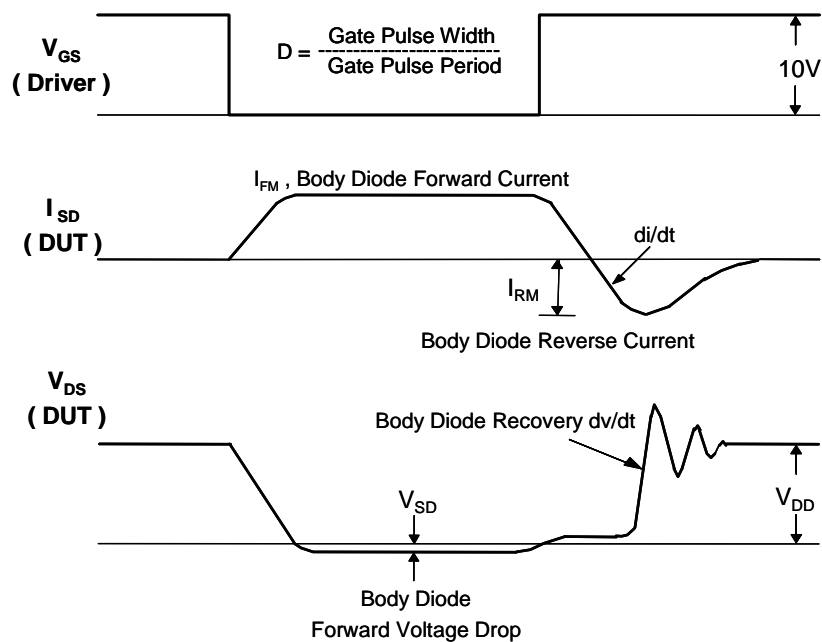
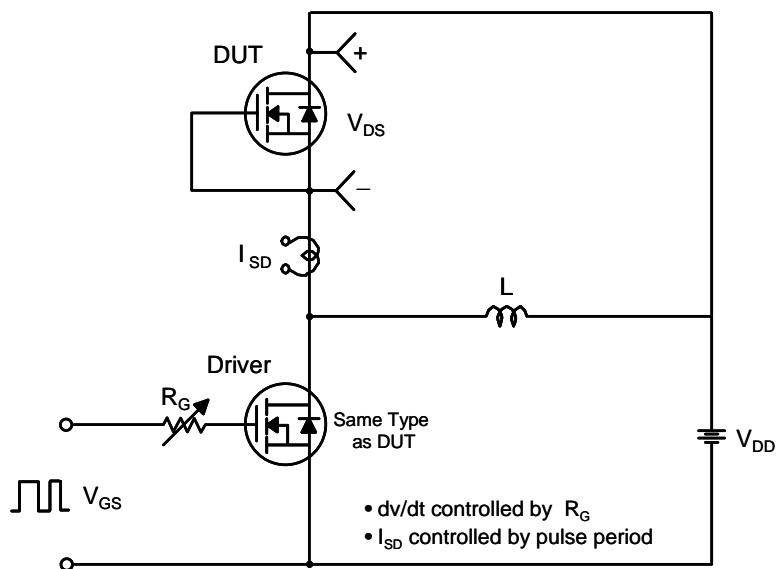
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

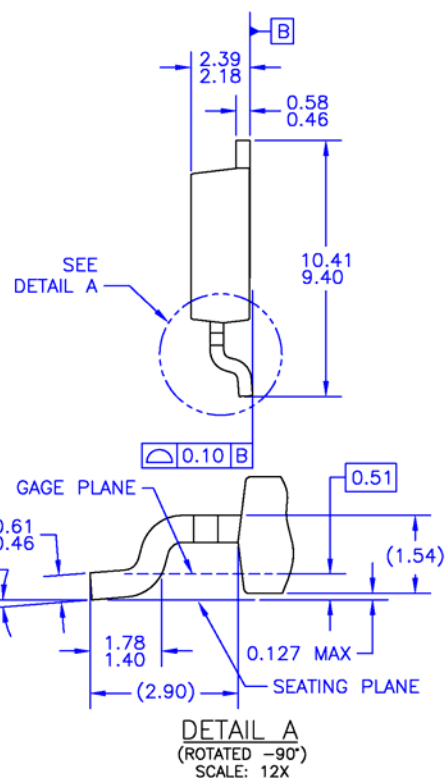
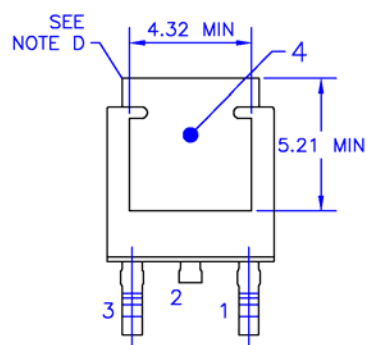
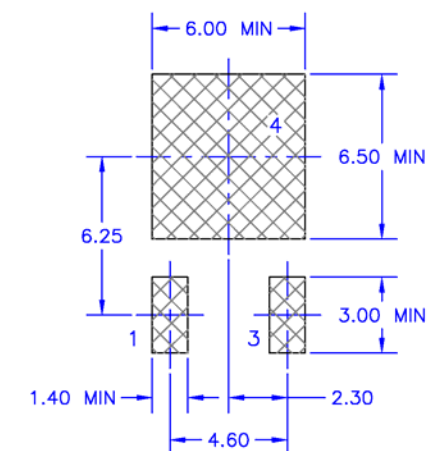
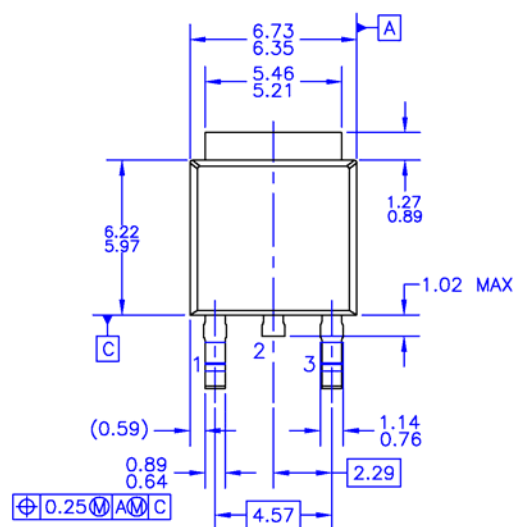


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

D-PAK







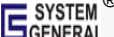
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- THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA.
 - ALL DIMENSIONS ARE IN MILLIMETERS.
 - DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
 - HEAT SINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION.
 - PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL.
 - DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
 - LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO220P1003X238-3N.
 - DRAWING NUMBER AND REVISION: MKT-TO252A03REV8

Dimensions in Millimeters



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