

FDA8440

N-Channel Logic Level PowerTrench® MOSFET

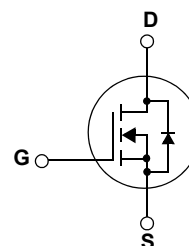
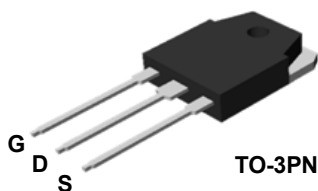
40 V, 100 A, 2.1 mΩ

Features

- $R_{DS(on)} = 1.46 \text{ m}\Omega$ (Typ.) @ $V_{GS} = 10 \text{ V}$, $I_D = 80 \text{ A}$
- $Q_{G(tot)} = 345 \text{ nC}$ (Typ.) @ $V_{GS} = 10 \text{ V}$
- Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)
- 160A Guarantee for 2 sec
- RoHS Compliant

Applications

- Power tools
- Motor drives and Uninterruptible Power Supplies
- Synchronous Rectification
- Battery Protection Circuit



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

Symbol	Parameter	FDA8440	Unit
V_{DSS}	Drain to Source Voltage	40	V
V_{GSS}	Gate to Source Voltage	± 20	V
I_D	Drain Current - Continuous ($T_C = 155^\circ\text{C}$)	100	A
	- Continuous ($T_A = 25^\circ\text{C}$, $V_{GS} = 10\text{V}$, $R_{\theta JA} = 40^\circ\text{C/W}$)	30	A
	- Pulsed	500	A
E_{AS}	Single Pulsed Avalanche Energy (Note 1)	1682	mJ
P_D	Power dissipation	306	W
	Derate above 25°C	2.04	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature	-55 to +175	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.49	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max. (Note 2)	40	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDA8440	FDA8440	TO-3PN	N/A	N/A	30units

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
Off Characteristics							
BV _{DSS}	Drain to Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	40	--	--	V	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 32V	--	--	1	μA	
		V _{GS} = 0V T _C = 150°C	--	--	250	μA	
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±20V	--	--	±100	nA	
On Characteristics							
V _{GS(th)}	Gate to Source Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1	--	3	V	
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 4.5V, I _D = 80A	--	1.56	2.2	mΩ	
		V _{GS} = 10V, I _D = 80A	--	1.46	2.1		
		V _{GS} = 10V, I _D = 80A, T _C = 175°C	--	2.82	4.1		
Dynamic Characteristics							
C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz	--	18600	24740	pF	
C _{oss}	Output Capacitance		--	1840	2450	pF	
C _{rss}	Reverse Transfer Capacitance		--	1400	2100	pF	
R _G	Gate Resistance	V _{GS} = 0.5V, f = 1MHz	--	1.1	--	Ω	
Q _{g(tot)}	Total Gate Charge at 10V	V _{GS} = 0V to 10V	V _{DD} = 20V I _D = 80A I _g = 1.0mA	--	345	450	nC
Q _{g(2)}	Threshold Gate Charge	V _{GS} = 0V to 2V		--	32.5	--	nC
Q _{gs}	Gate to Source Gate Charge			--	49	--	nC
Q _{gs2}	Gate Charge Threshold to Plateau			--	16.5	--	nC
Q _{gd}	Gate to Drain "Miller" Charge			--	74	--	nC
Switching Characteristics (V _{GS} = 10V)							
t _{ON}	Turn-On Time	V _{DD} = 20V, I _D = 80A V _{GS} = 10V, R _{GEN} = 7Ω	--	175	360	ns	
t _{d(on)}	Turn-On Delay Time		--	43	95	ns	
t _r	Rise Time		--	130	275	ns	
t _{d(off)}	Turn-Off Delay Time		--	435	875	ns	
t _f	Fall Time		--	290	590	ns	
t _{OFF}	Turn-Off Time		--	730	1470	ns	
Drain-Source Diode Characteristics and Maximum Ratings							
V _{SD}	Source to Drain Diode Voltage	I _{SD} = 80A	--	--	1.25	V	
		I _{SD} = 40A	--	--	1.0	V	
t _{rr}	Reverse Recovery Time	I _{SD} = 75A, dI _{SD} /dt = 100A/μs	--	59	--	ns	
Q _{RR}	Reverse Recovery Charge	I _{SD} = 75A, dI _{SD} /dt = 100A/μs	--	77	--	nC	

NOTES:

1: Starting T_J = 25°C, L = 1mH, I_{AS} = 58A, V_{DD} = 36V, V_{GS} = 10V.

2: Pulse width = 100s

Typical Performance Characteristics

Figure 1. On-Region Characteristics

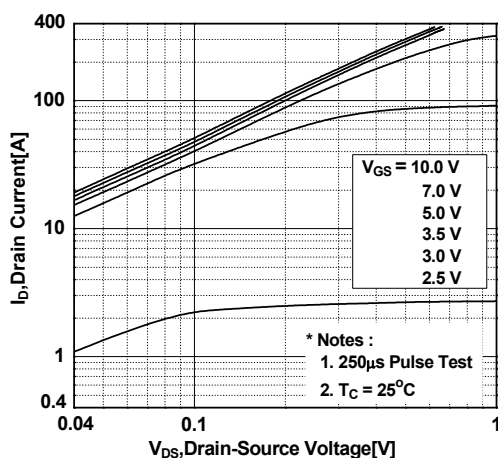


Figure 2. Transfer Characteristics

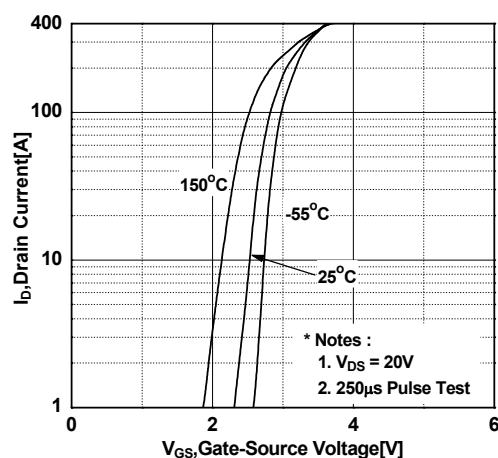


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

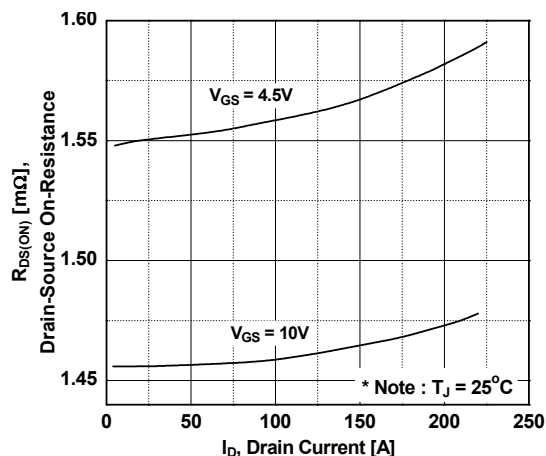


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

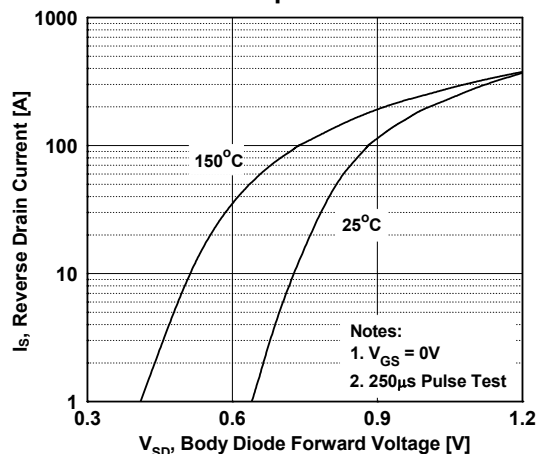


Figure 5. Capacitance Characteristics

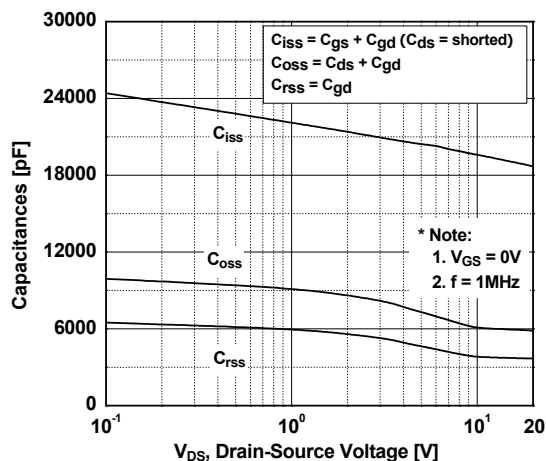
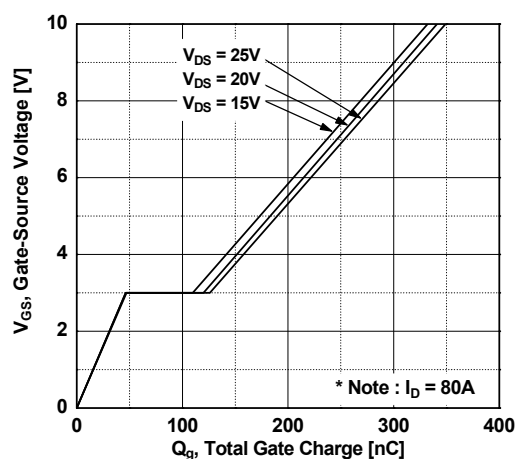


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

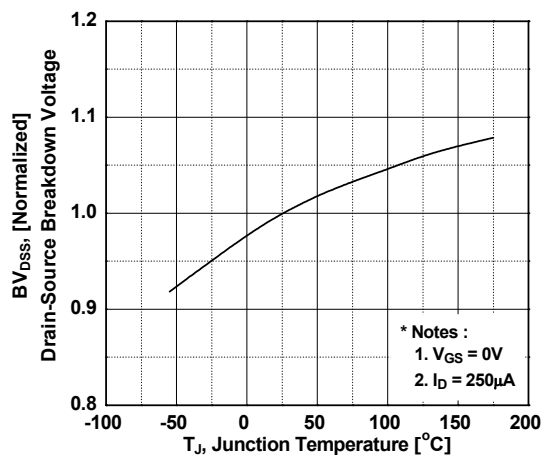


Figure 8. On-Resistance Variation vs. Temperature

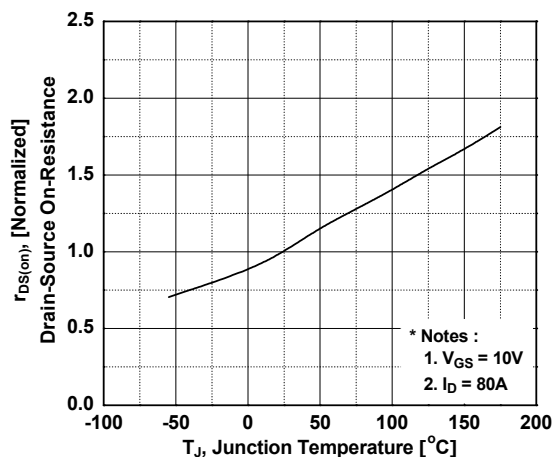


Figure 9. Unclamped Inductive Switching Capability

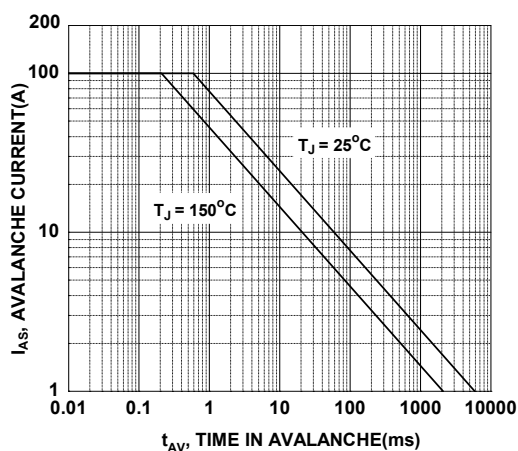


Figure 10. Safe Operating Area

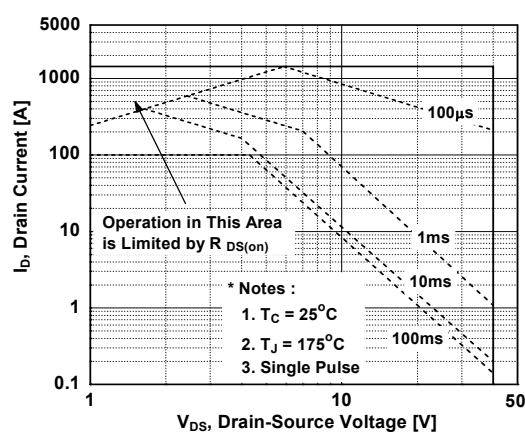
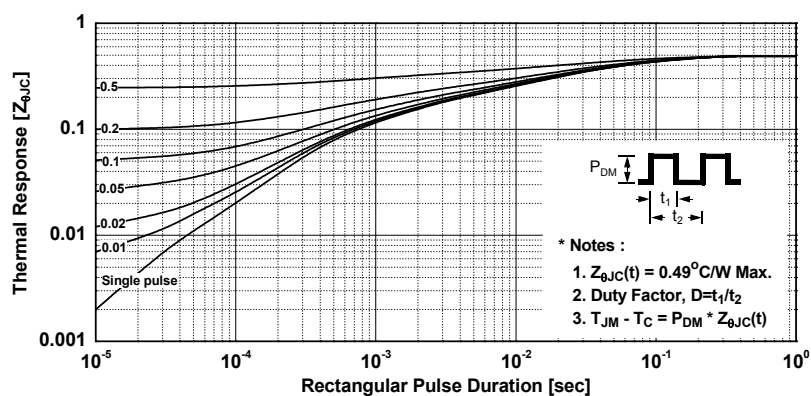


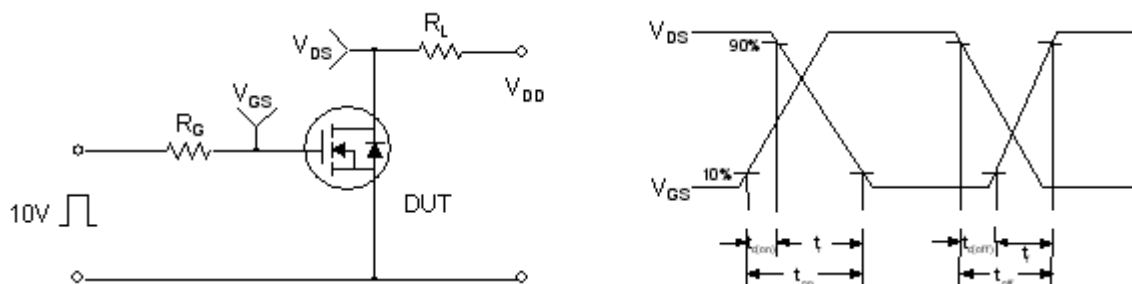
Figure 11. Transient Thermal Response Curve



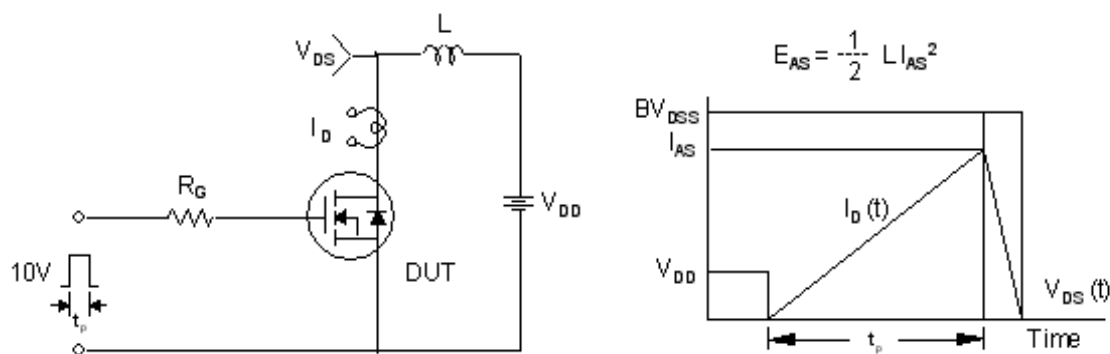
Gate Charge Test Circuit & Waveform



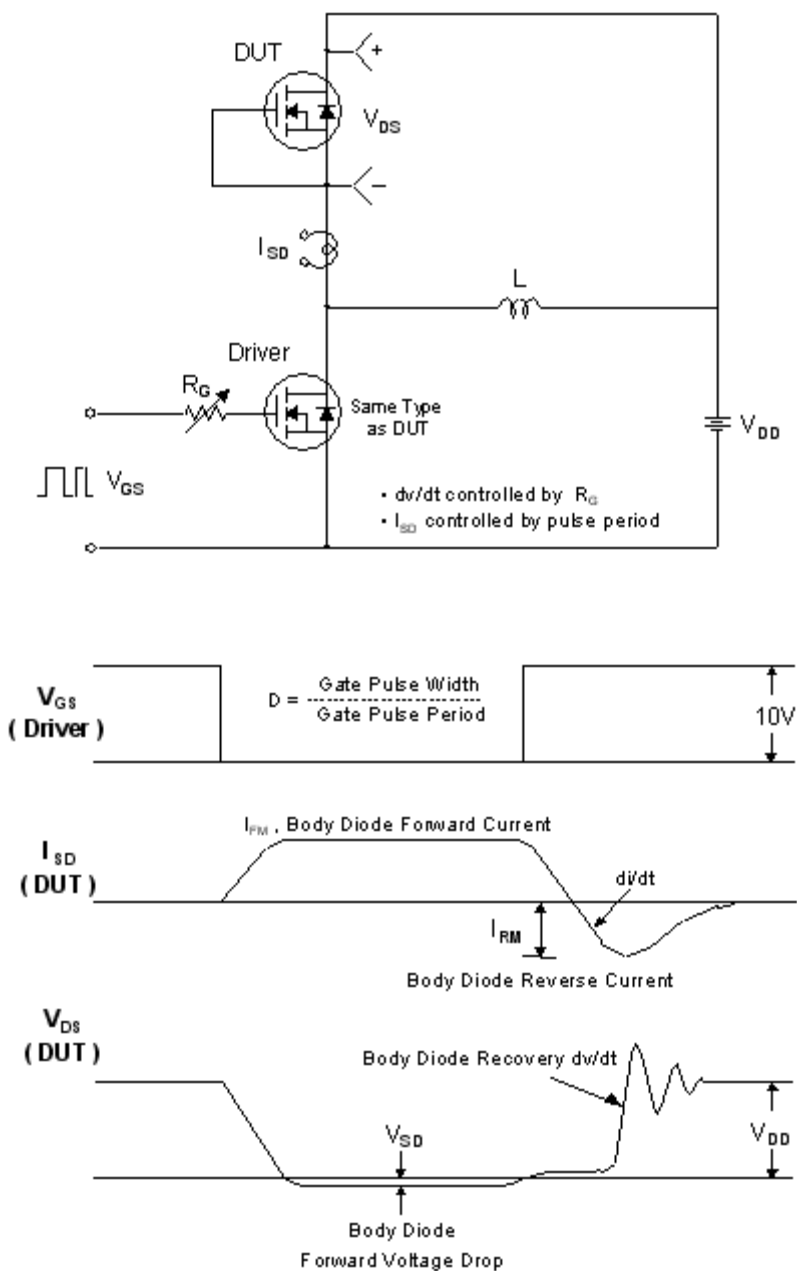
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

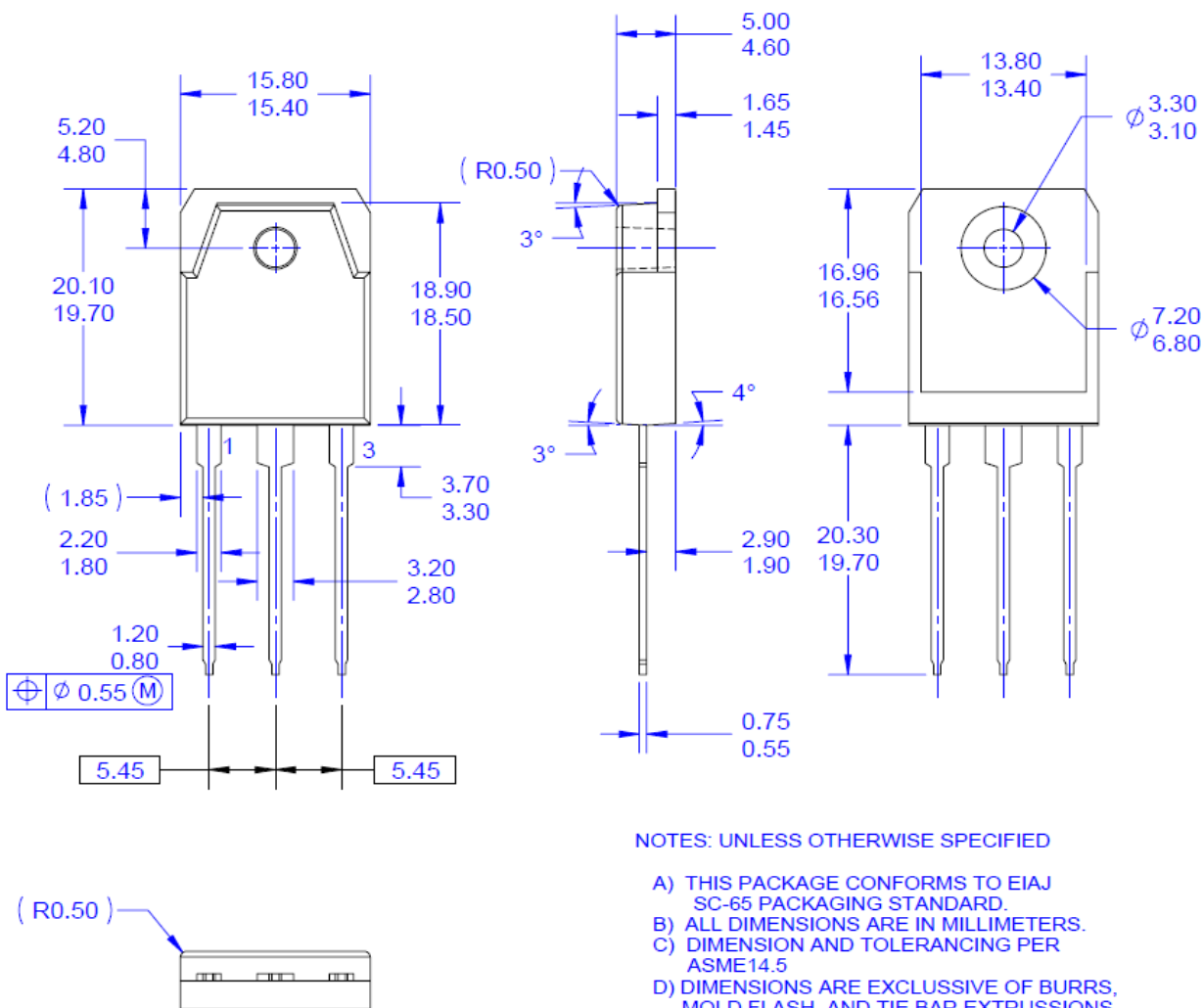


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

TO-3PN



NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO EIAJ SC-65 PACKAGING STANDARD.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSION AND TOLERANCING PER ASME14.5
- D) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- E) THIS PACKAGE IS INTENDED ONLY FOR TO3PN.
- F) DRAWING FILE NAME: TO3P03AREV4.

Dimensions in Millimeters

