

ON Semiconductor

Is Now

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FCA76N60N

N-Channel SupreMOS® MOSFET

600 V, 76 A, 36 mΩ

Features

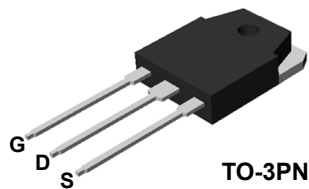
- $R_{DS(on)} = 28 \text{ m}\Omega$ (Typ.) @ $V_{GS} = 10 \text{ V}$, $I_D = 38 \text{ A}$
- Ultra Low Gate Charge (Typ. $Q_g = 218 \text{ nC}$)
- Low Effective Output Capacitance (Typ. $C_{oss(eff.)} = 914 \text{ pF}$)
- 100% Avalanche Tested
- RoHS Compliant

Application

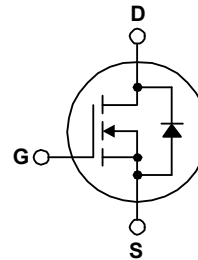
- Solar Inverter
- AC-DC Power Supply

Description

The SupreMOS® MOSFET is ON Semiconductor's next generation of high voltage super-junction (SJ) technology employing a deep trench filling process that differentiates it from the conventional SJ MOSFETs. This advanced technology and precise process control provides lowest Rsp on-resistance, superior switching performance and ruggedness. SupreMOS MOSFET is suitable for high frequency switching power converter applications such as PFC, server/telecom power, FPD TV power, ATX power, and industrial power applications.



TO-3PN



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

Symbol	Parameter	FCA76N60N	Unit
V_{DSS}	Drain to Source Voltage	600	V
V_{GSS}	Gate to Source Voltage	± 30	V
I_D	Drain Current	- Continuous ($T_C = 25^\circ\text{C}$)	76
		- Continuous ($T_C = 100^\circ\text{C}$)	48.1
I_{DM}	Drain Current	- Pulsed (Note 1)	228
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	8022
I_{AR}	Avalanche Current	(Note 1)	76
E_{AR}	Repetitive Avalanche Energy	(Note 1)	5.40
dv/dt	MOSFET dv/dt Ruggedness	(Note 3)	100
	Peak Diode Recovery dv/dt		12
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	543
		- Derate Above 25°C	5.40
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	FCA76N60N	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.23	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	40	

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FCA76N60N	FCA76N60N	TO-3PN	Tube	N/A	N/A	30 units

Electrical Characteristics T_C = 25°C unless otherwise noted.

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

BV _{DSS}	Drain to Source Breakdown Voltage	I _D = 1 mA, V _{GS} = 0 V, T _J = 25°C	600	-	-	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 1 mA, Referenced to 25°C	-	0.73	-	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 480 V, V _{GS} = 0 V	-	-	10	μA
		V _{DS} = 480 V, T _J = 125°C	-	-	100	
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±30 V, V _{DS} = 0 V	-	-	±100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 250 μA	2.0	-	4.0	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 38 A	-	28.5	36.0	mΩ
g _{FS}	Forward Transconductance	V _{DS} = 20 V, I _D = 38 A	-	88	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 100 V, V _{GS} = 0 V, f = 1 MHz	-	9310	12385	pF
C _{oss}	Output Capacitance		-	370	495	pF
C _{rss}	Reverse Transfer Capacitance		-	3.1	5.0	pF
C _{oss}	Output Capacitance	V _{DS} = 380 V, V _{GS} = 0 V, f = 1 MHz	-	196	-	pF
C _{oss(eff.)}	Effective Output Capacitance	V _{DS} = 0 V to 380 V, V _{GS} = 0 V	-	914	-	pF
Q _{g(tot)}	Total Gate Charge at 10V	V _{DS} = 380 V, I _D = 38 A, V _{GS} = 10 V (Note 4)	-	218	285	nC
Q _{gs}	Gate to Source Gate Charge		-	39	-	nC
Q _{gd}	Gate to Drain "Miller" Charge		-	66	-	nC
ESR	Equivalent Series Resistance (G-S)	f = 1 MHz	-	1.0	-	Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{DD} = 380 V, I _D = 38 A, V _{GS} = 10 V, R _G = 4.7 Ω (Note 4)	-	34	78	ns
t _r	Turn-On Rise Time		-	24	58	ns
t _{d(off)}	Turn-Off Delay Time		-	235	480	ns
t _f	Turn-Off Fall Time		-	32	74	ns

Drain-Source Diode Characteristics

I _S	Maximum Continuous Drain to Source Diode Forward Current	-	-	76	A	
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current	-	-	228	A	
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0 V, I _{SD} = 38 A	-	-	1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 38 A,	-	613	-	ns
Q _{rr}	Reverse Recovery Charge	di _F /dt = 100 A/μs	-	16	-	μC

Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. I_{AS} = 25.3 A, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 76 A, di/dt ≤ 200 A/μs, V_{DD} ≤ 380 V, starting T_J = 25°C.
4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

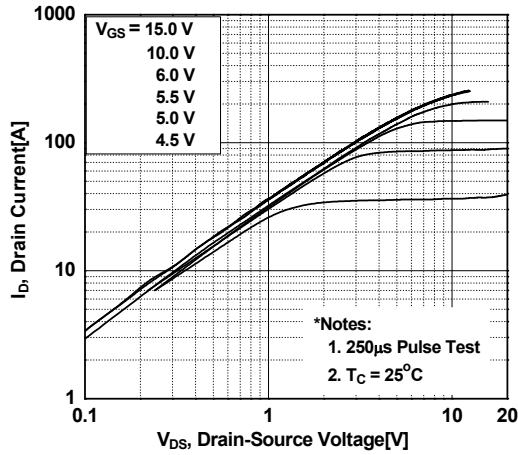


Figure 2. Transfer Characteristics

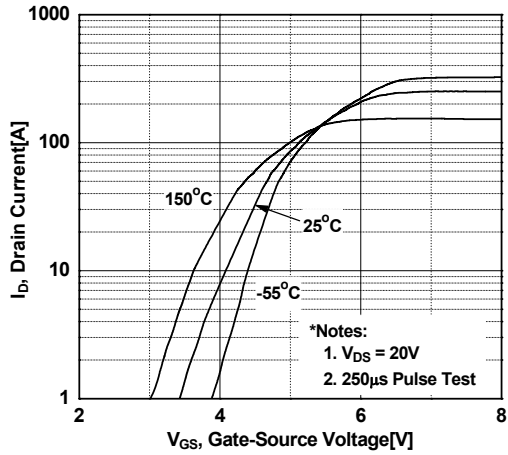


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

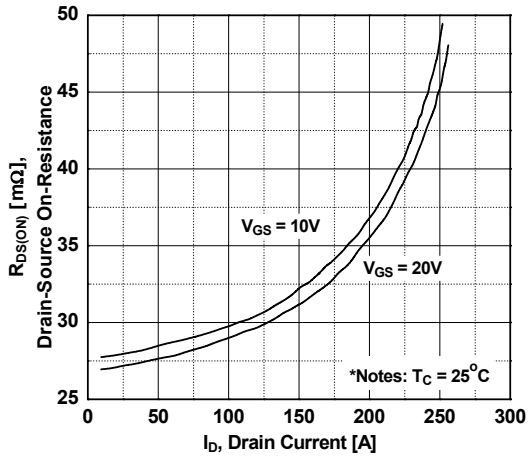


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

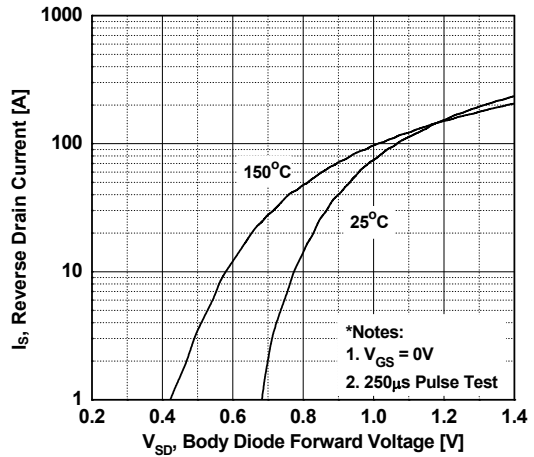


Figure 5. Capacitance Characteristics

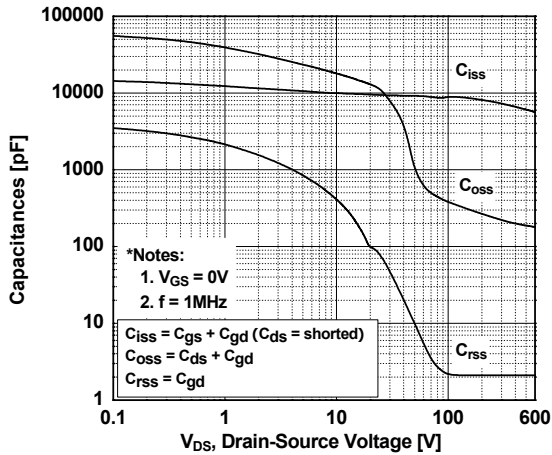
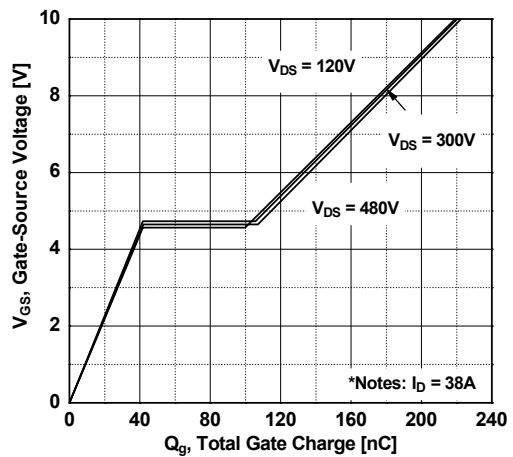


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

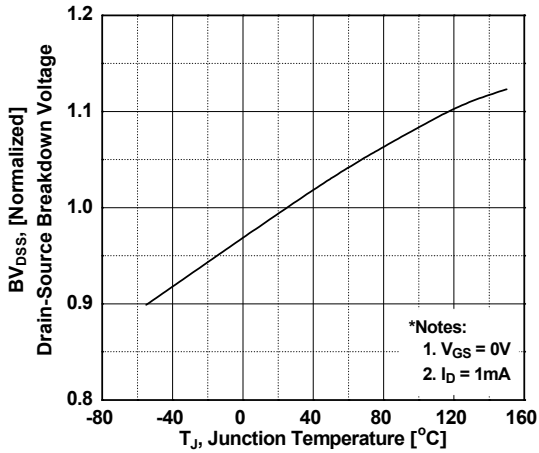


Figure 8. On-Resistance Variation vs. Temperature

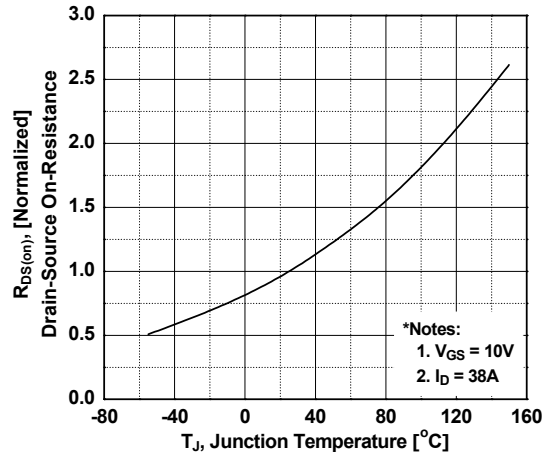


Figure 9. Maximum Safe Operating Area

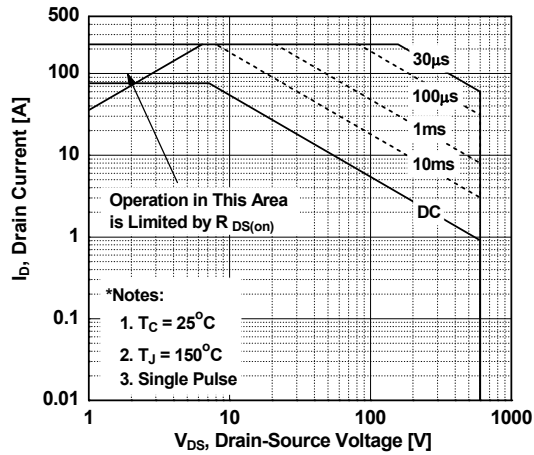


Figure 10. Maximum Drain Current vs. Case Temperature

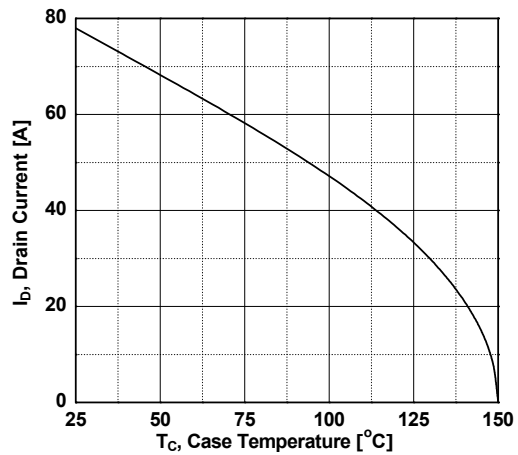
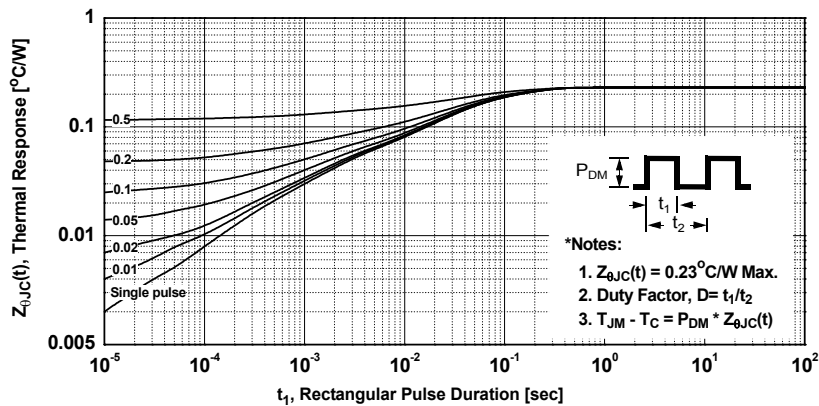


Figure 11. Transient Thermal Response Curve



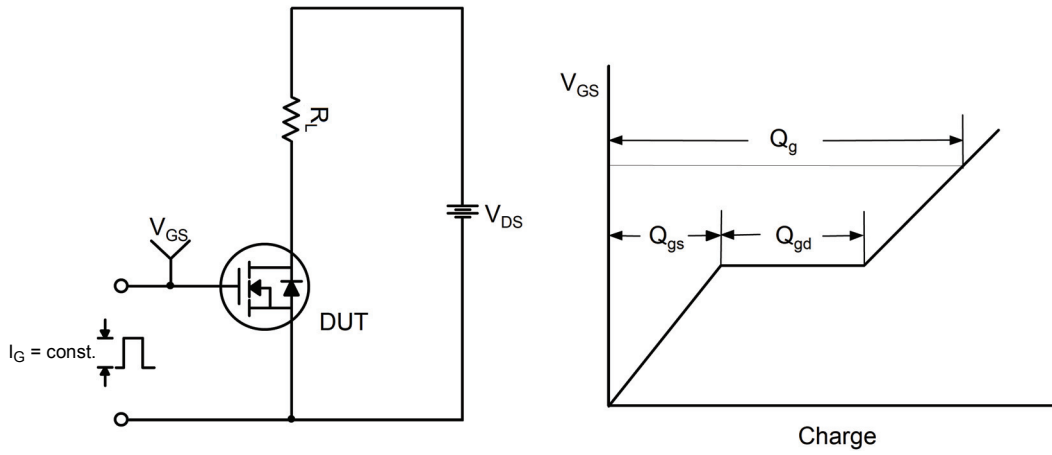


Figure 12. Gate Charge Test Circuit & Waveform

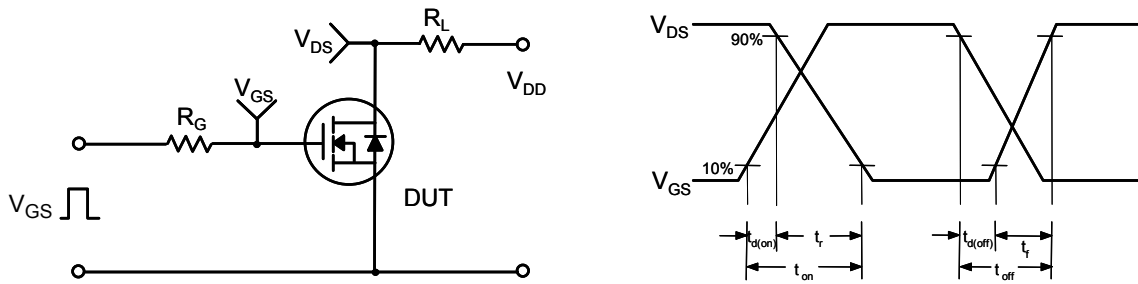


Figure 13. Resistive Switching Test Circuit & Waveforms



Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

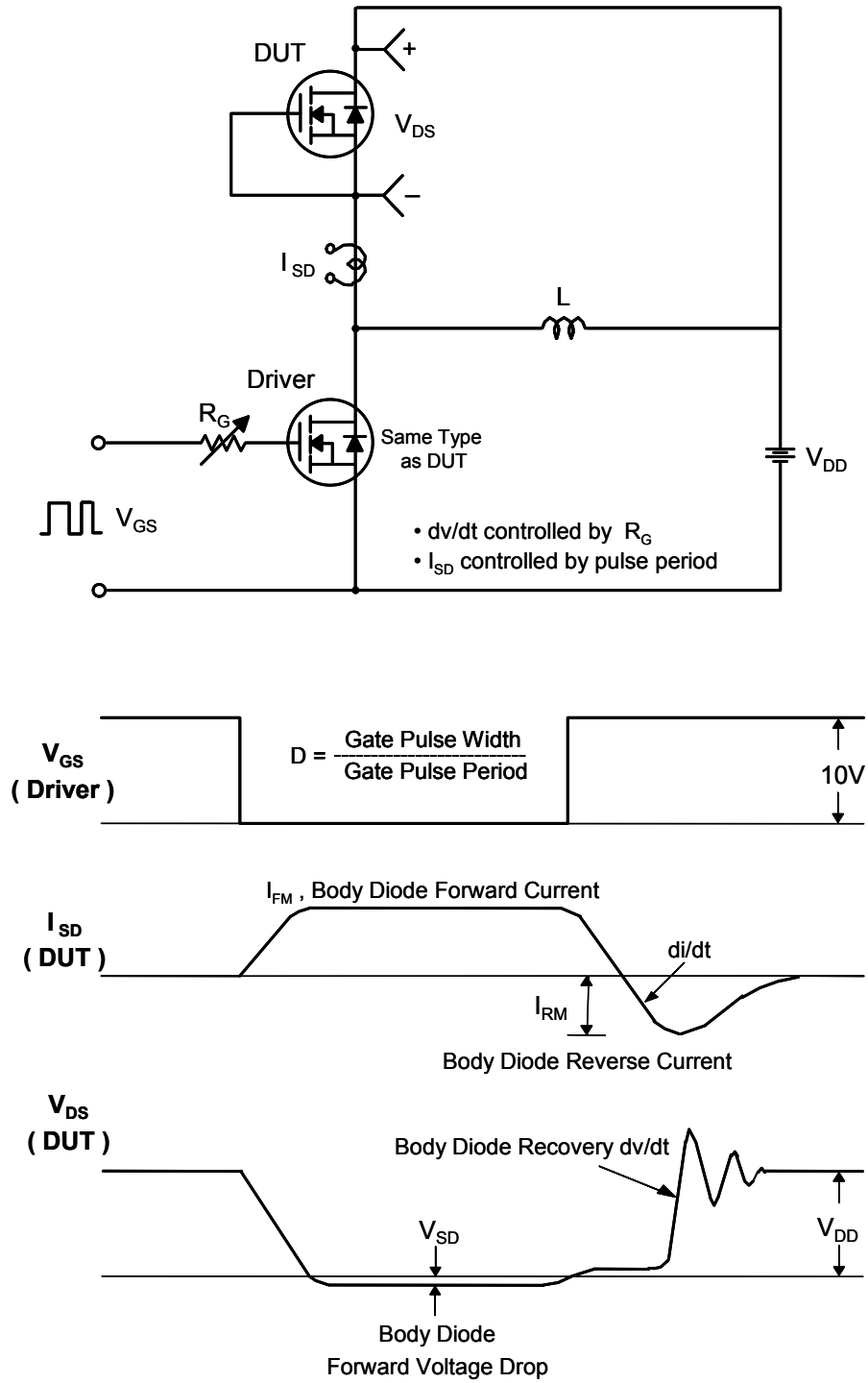
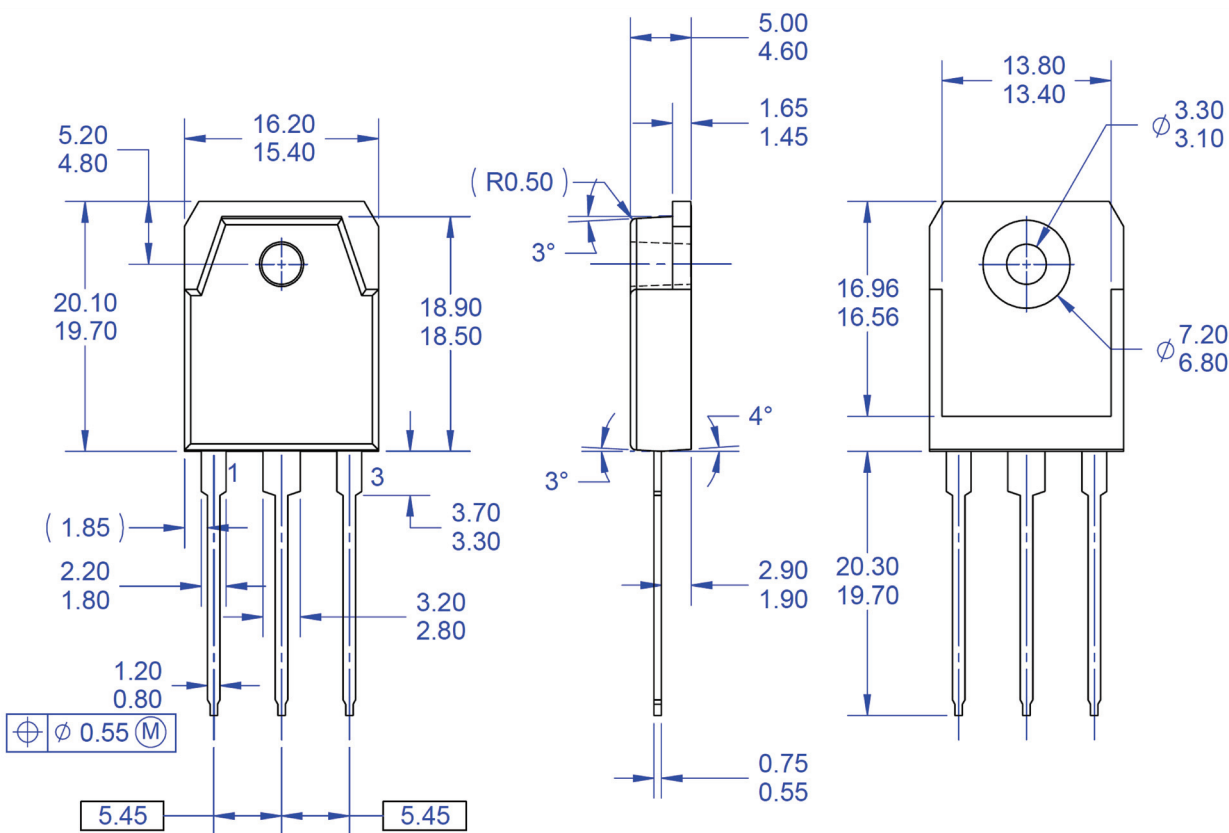


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions




NOTES: UNLESS OTHERWISE SPECIFIED

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- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSION AND TOLERANCING PER ASME14.5-2009.
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- F) FAIRCHILD SEMICONDUCTOR.

Figure 16. TO3PN, 3-Lead, Plastic, EIAJ SC-65

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