

FQU3N60CTU

N-Channel QFET[®] MOSFET

600 V, 2.4 A, 3.4 Ω

This N-Channel enhancement mode power MOSFET is produced using ON Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, active power factor correction (PFC), and electronic lamp ballasts.

Features

- 2.4 A, 600 V, $R_{DS(on)} = 3.4 \Omega$ (Max.) @ $V_{GS} = 10$ V, $I_D = 1.2$ A
- Low Gate Charge (Typ. 10.5 nC)
- Low C_{rss} (Typ. 5 pF)
- 100% Avalanche Tested
- These Devices are Pb-Free and are RoHS Compliant

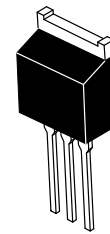
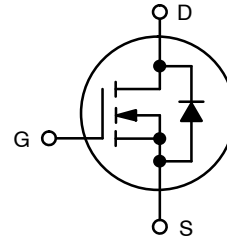
Applications

- LCD / LED TV
- Lighting
- Charger / Adapter



ON Semiconductor[®]

www.onsemi.com



**IPAK3
CASE 369AR**

ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 2 of this data sheet.

FQU3N60CTU

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Value	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°C)	2.4
		Continuous (T _C = 100°C)	1.5
I _{DM}	Drain Current	Pulsed (Note 1)	9.6
E _{AS}	Single Pulse Avalanche Energy (Note 2)	150	mJ
I _{AR}	Avalanche Current (Note 1)	2.4	A
E _{AR}	Repetitive Avalanche Energy (Note 1)	4.0	mJ
dv/dt	Peak Diode Recovery (Note 3)	4.5	V/ns
P _D	Power Dissipation	T _C = 25°C	50
		Derate Above 25°C	0.4
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T _L	Maximum Lead Temperature for Soldering Purposes (1/8" from case for 5 seconds)	300	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. I_{AS} = 2.4 A, V_{DD} = 50 V, L = 47 mH, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 3 A, di/dt ≤ 200 A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
R _{θJC}	Thermal Resistance, Junction-to-Case, Max.	2.5	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient, Max.	110	

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FQU3N60CTU	FQU3N60C	IPAK	Tube	N/A	N/A	75 units

FQU3N60CTU

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

BV_{DSS}	Drain-to-Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	600	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C	-	0.6	-	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 600 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	1	μA
		$V_{DS} = 480 \text{ V}, T_C = 125^\circ\text{C}$	-	-	10	
I_{GSSF}	Gate-to-Body Leakage Current	$V_{GS} = 30 \text{ V}, V_{DS} = 0 \text{ V}$	-	-	100	nA
I_{GSSR}	Gate-to-Body Leakage Current	$V_{GS} = -30 \text{ V}, V_{DS} = 0 \text{ V}$	-	-	-100	nA

ON CHARACTERISTICS

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-to-Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 1.2 \text{ A}$	-	2.8	3.4	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40 \text{ V}, I_D = 1.2 \text{ A}$	-	3.5	-	S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	-	435	565	pF
C_{oss}	Output Capacitance		-	45	60	
C_{rss}	Reverse Transfer Capacitance		-	5	8	

SWITCHING CHARACTERISTICS

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 300 \text{ V}, I_D = 3 \text{ A}, R_G = 25 \Omega$ (Note 4)	-	12	34	ns
t_r	Turn-On Rise Time		-	30	70	
$t_{d(off)}$	Turn-Off Delay Time		-	35	80	
t_f	Turn-Off Fall Time		-	35	80	
Q_g	Total Gate Charge at 10 V	$V_{DS} = 480 \text{ V}, I_D = 3 \text{ A}, V_{GS} = 10 \text{ V}$ (Note 4)	-	10.5	14	nC
Q_{gs}	Gate-to-Source Gate Charge		-	2.1	-	
Q_{gd}	Gate-to-Drain "Miller" Charge		-	4.5	-	

DRAIN-SOURCE DIODE CHARACTERISTICS

I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	3	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	12	
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 2.4 \text{ A}$	-	-	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0 \text{ V}, I_S = 3 \text{ A}, dI_F/dt = 100 \text{ A}/\mu\text{s}$	-	260	-	ns
Q_{rr}	Reverse Recovery Charge		-	1.6	-	μC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Essentially independent of operating temperature.

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TYPICAL CHARACTERISTICS

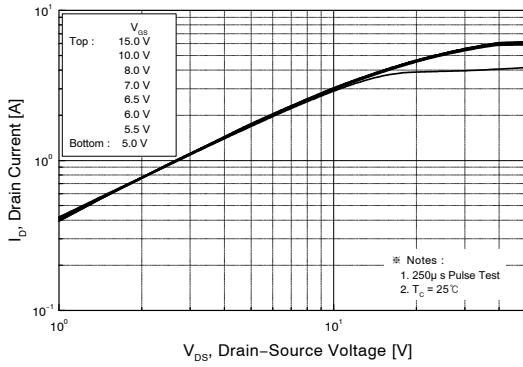


Figure 1. On-Region Characteristics

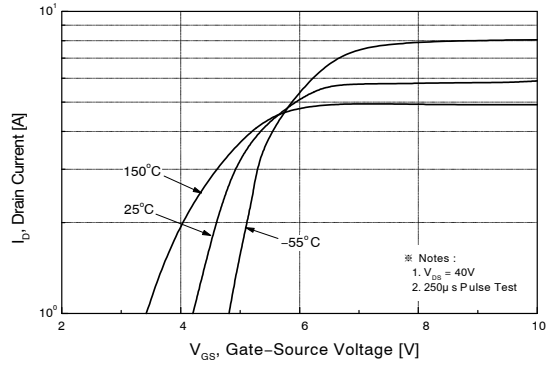


Figure 2. Transfer Characteristics

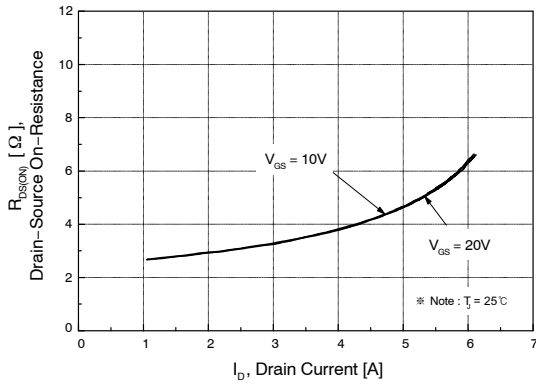


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

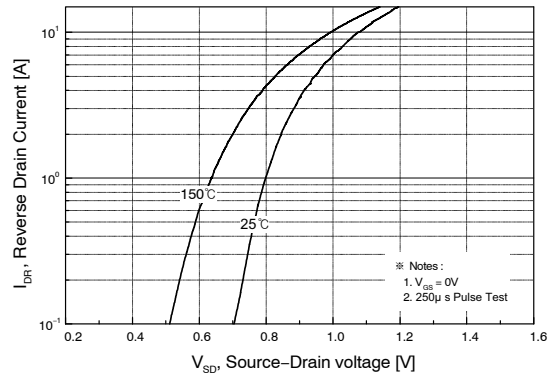


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

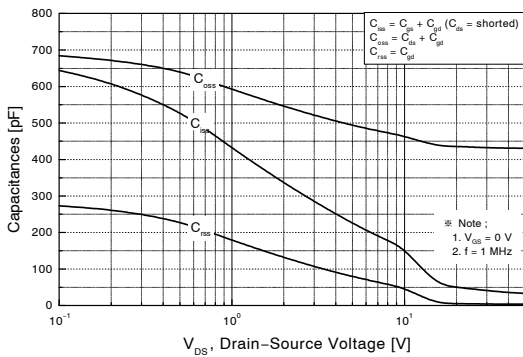


Figure 5. Capacitance Characteristics

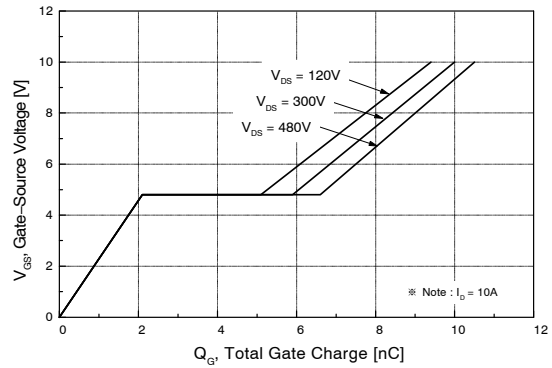


Figure 6. Gate Charge Characteristics

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TYPICAL CHARACTERISTICS

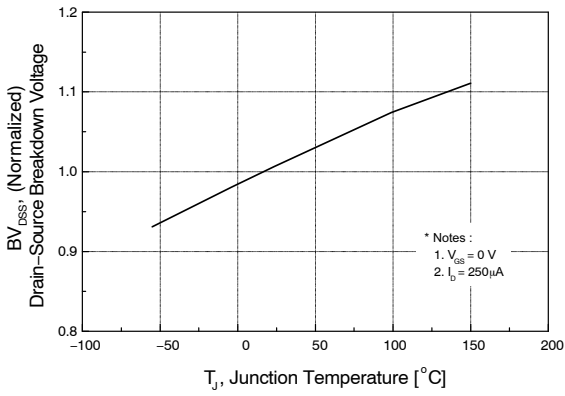


Figure 7. Breakdown Voltage Variation vs. Temperature

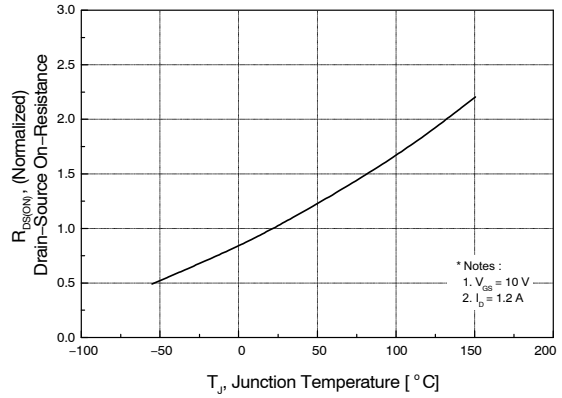


Figure 8. On-Resistance Variation vs. Temperature

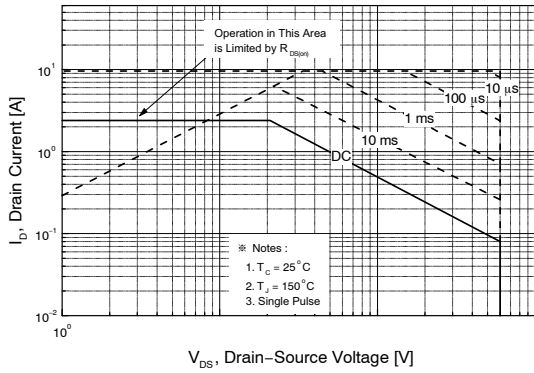


Figure 9. Maximum Safe Operating Area

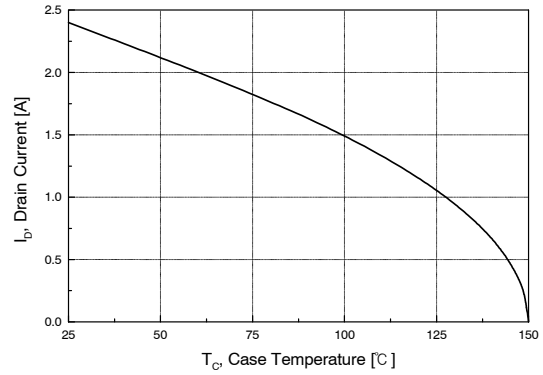


Figure 10. Maximum Drain Current vs. Case Temperature

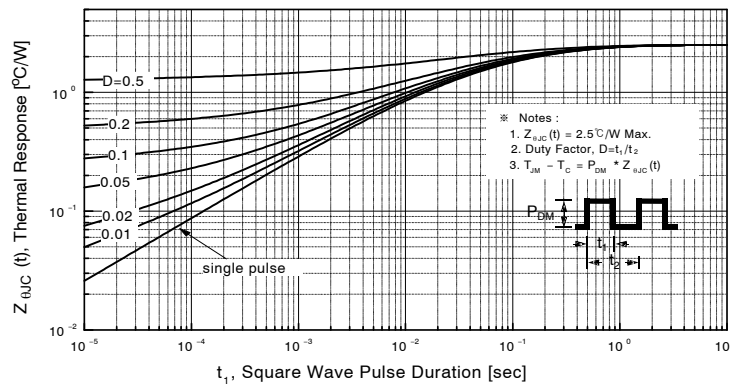


Figure 11. Transient Thermal Response Curve

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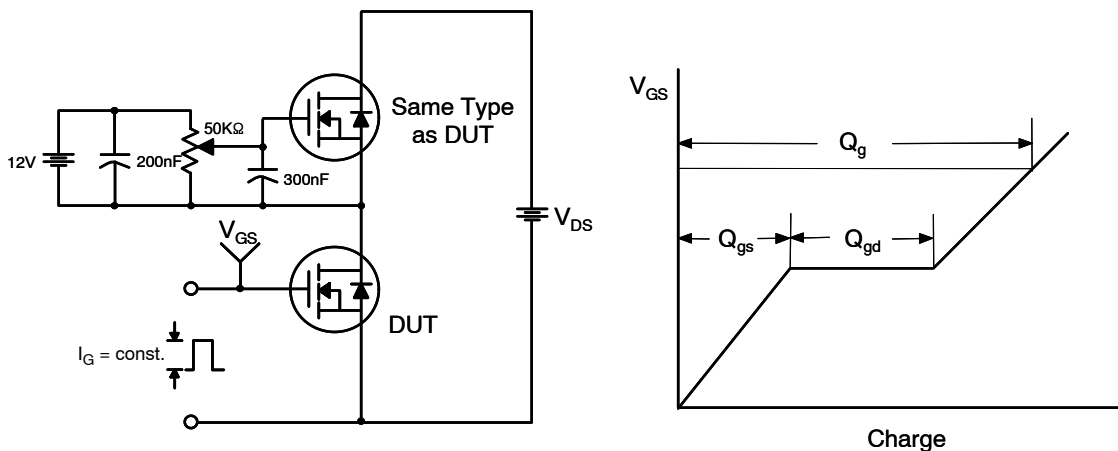


Figure 12. Gate Charge Test Circuit & Waveform

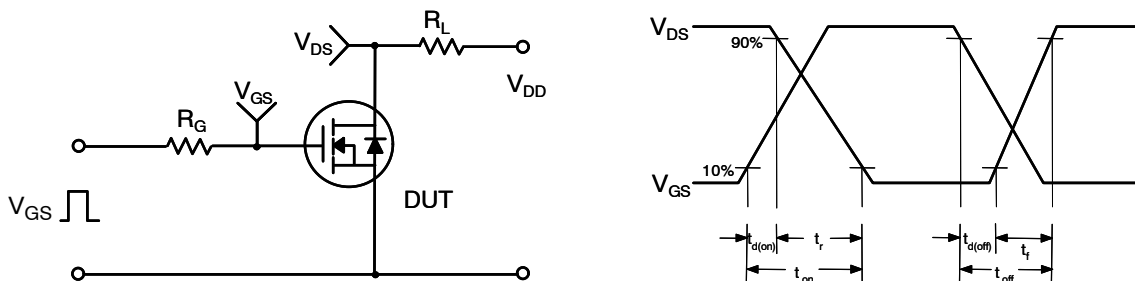


Figure 13. Resistive Switching Test Circuit & Waveforms

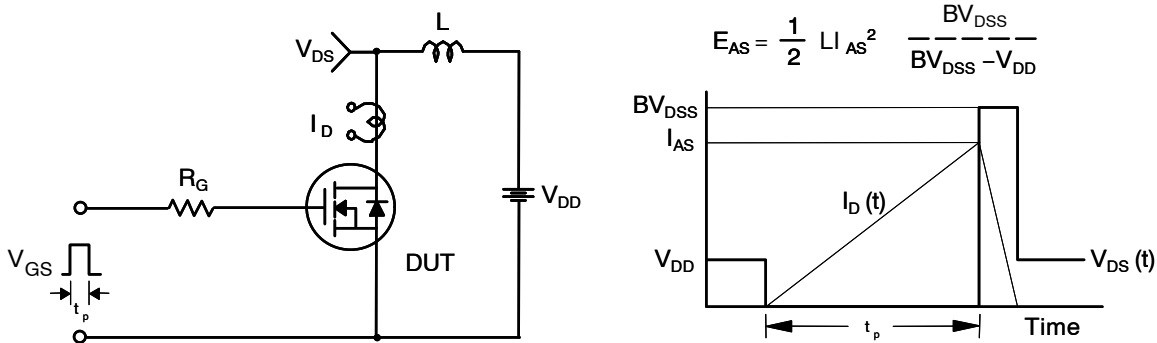


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

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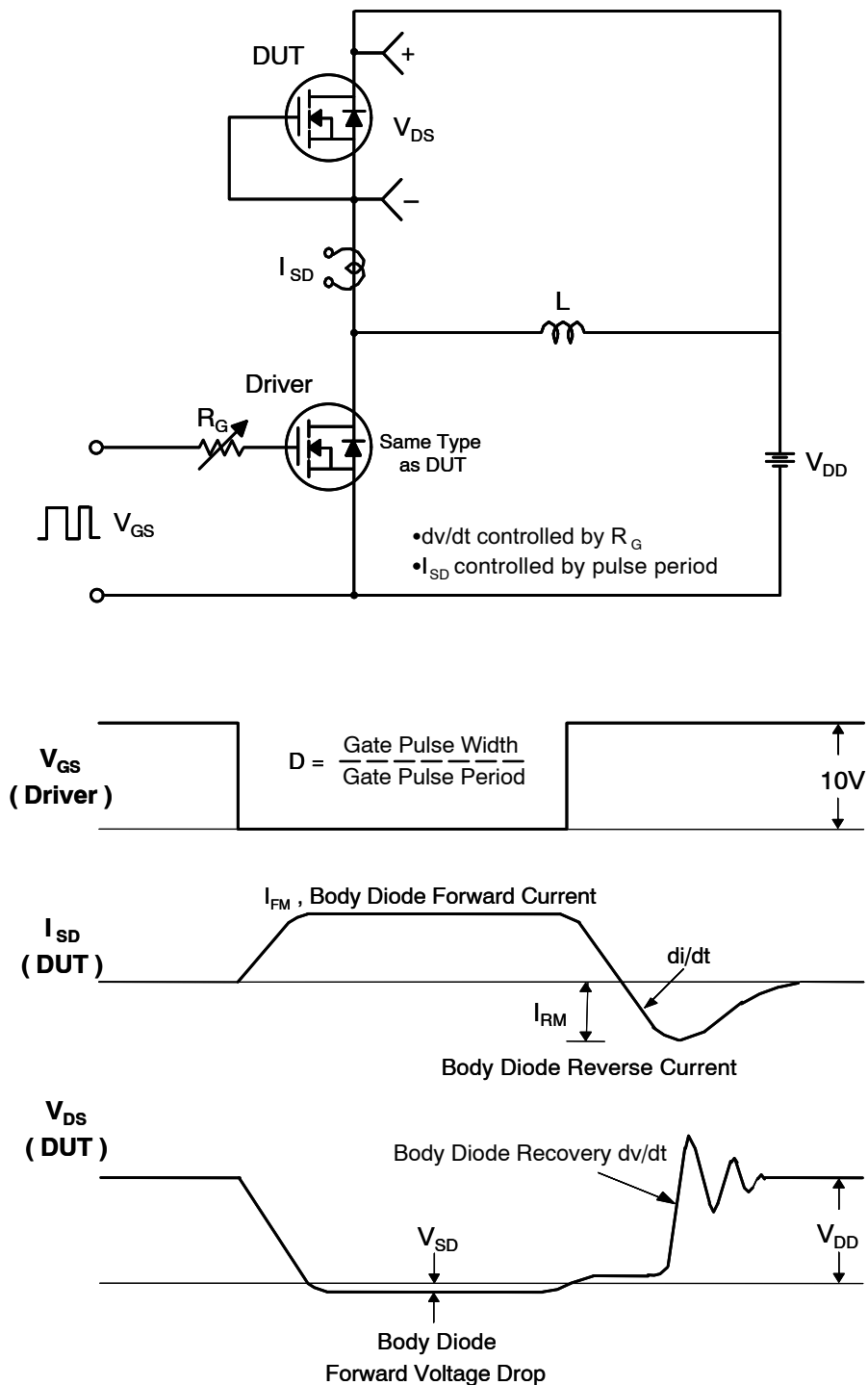
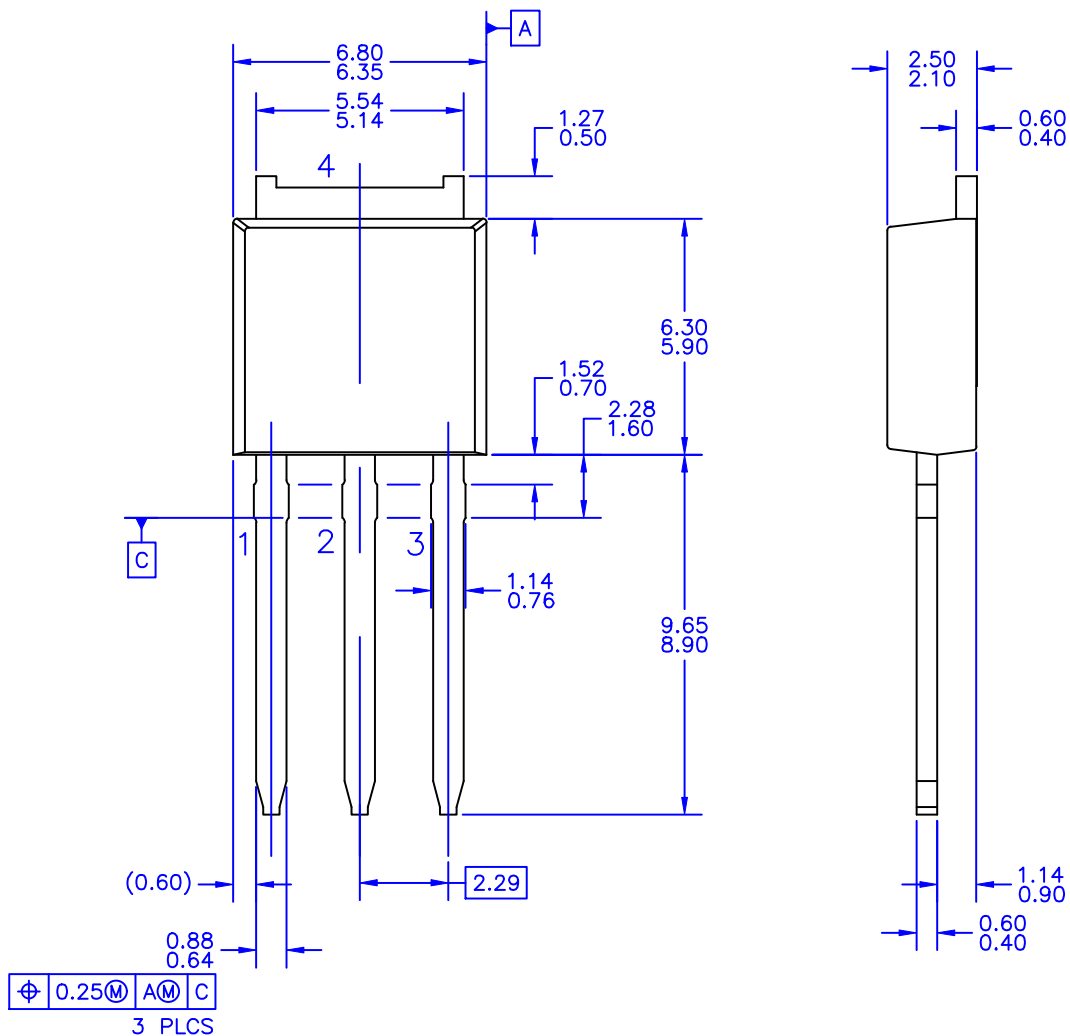


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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PACKAGE DIMENSIONS

DPAK3 (IPAK)
CASE 369AR
ISSUE O




NOTES: UNLESS OTHERWISE SPECIFIED

- A) ALL DIMENSIONS ARE IN MILLIMETERS.
- B) THIS PACKAGE CONFORMS TO JEDEC, TO-251, ISSUE C, VARIATION AA, DATED SEP 1988.
- C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.

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