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 Ω (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®

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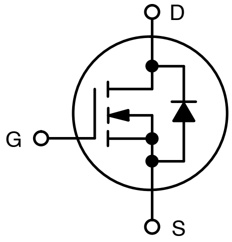
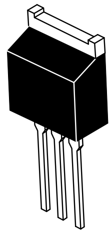




IPAK3
CASE 369AR

ORDERING INFORMATION

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

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	A
		Continuous (T_C = 100°C)	1.5	
I_{DM}	Drain Current	Pulsed (Note 1)	9.6	A
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	W
		Derate Above 25°C	0.4	W/°C
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. $I_{SD} \le 3$ A, di/dt ≤ 200 A/μs, $V_{DD} \le BV_{DSS}$, Starting T_J = 25°C.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction−to−Case, Max.	2.5	°C/W
$R_{\theta JA}$	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

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain–to–Source Breakdown Voltage	I_D = 250 µA, V_{GS} = 0 V	600	–	–	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250 µA, Referenced to 25°C	–	0.6	–	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600 V, V_{GS} = 0 V	–	–	1	µA
		V_{DS} = 480 V, T_C = 125°C	–	–	10	
I_{GSSF}	Gate–to–Body Leakage Current	V_{GS} = 30 V, V_{DS} = 0 V	–	–	100	nA
I_{GSSR}	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 = 1.2 A	–	2.8	3.4	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 1.2 A	–	3.5	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 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 V, I_D = 3 A, R_G = 25 Ω (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 V, I_D = 3 A, V_{GS} = 10 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 V, I_S = 2.4 A	–	–	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 3 A, dI_F/dt = 100 A/µs	–	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.

TYPICAL CHARACTERISTICS

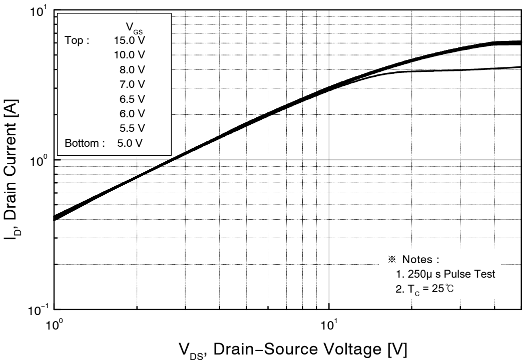


Figure 1. On−Region Characteristics

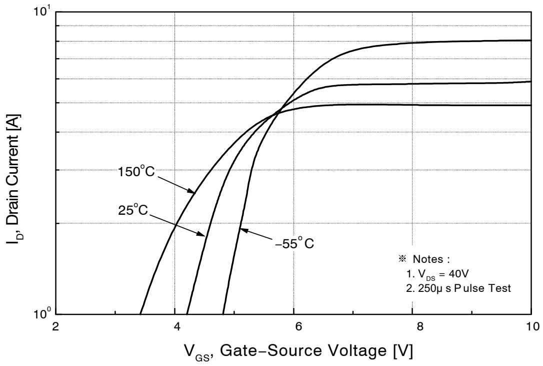


Figure 2. Transfer Characteristics

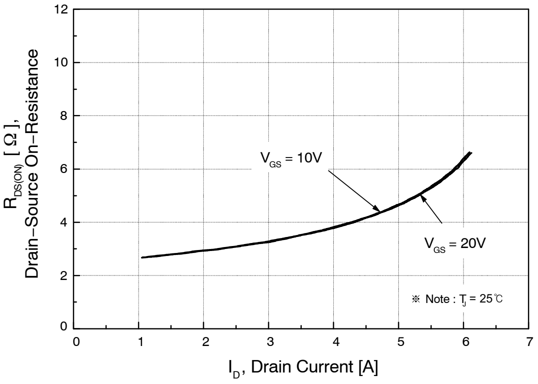


Figure 3. On−Resistance Variation vs. Drain Current and Gate Voltage

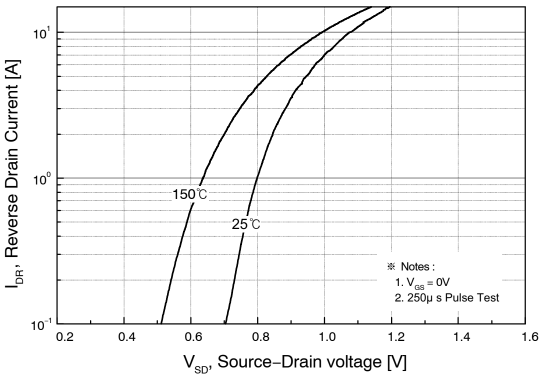


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

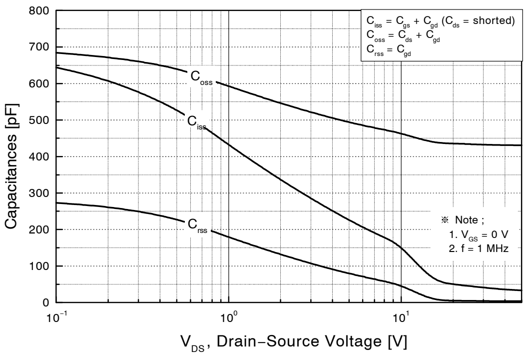


Figure 5. Capacitance Characteristics

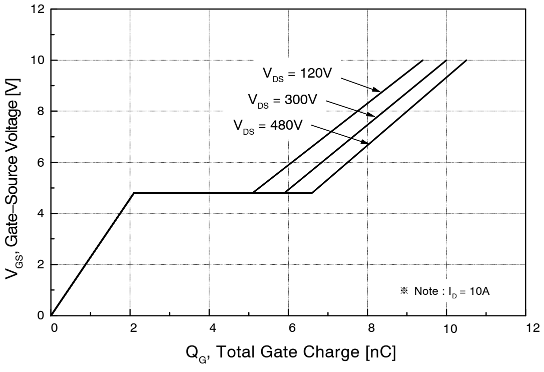


Figure 6. Gate Charge Characteristics

TYPICAL CHARACTERISTICS

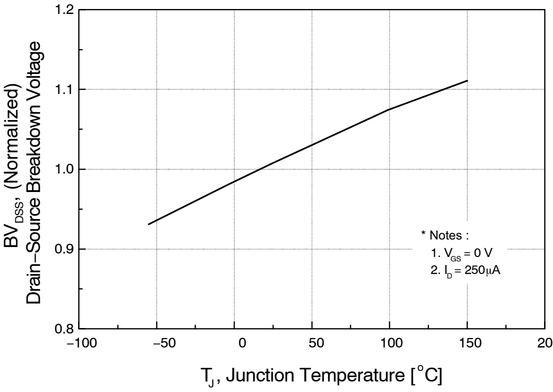


Figure 7. Breakdown Voltage Variation vs. Temperature

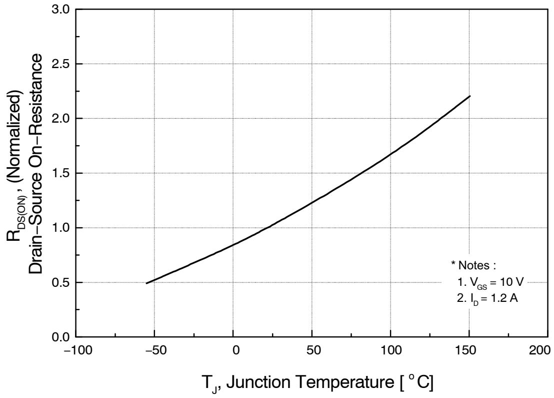


Figure 8. On−Resistance Variation vs. Temperature

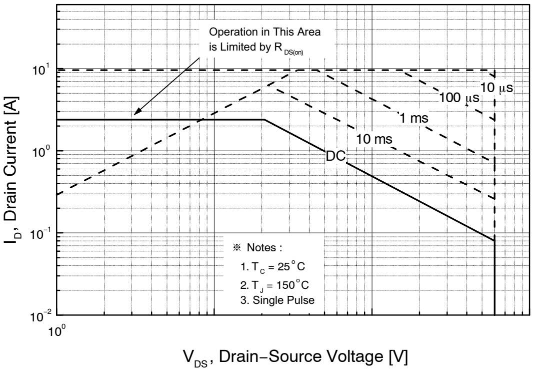


Figure 9. Maximum Safe Operating Area

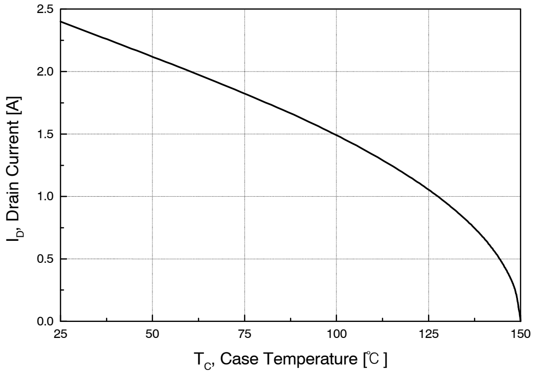


Figure 10. Maximum Drain Current vs. Case Temperature

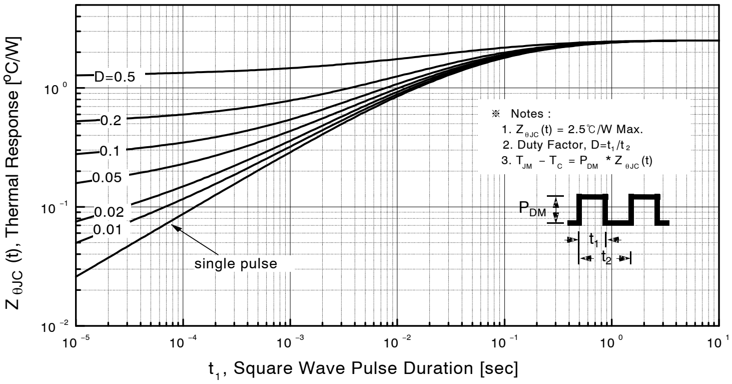


Figure 11. Transient Thermal Response Curve

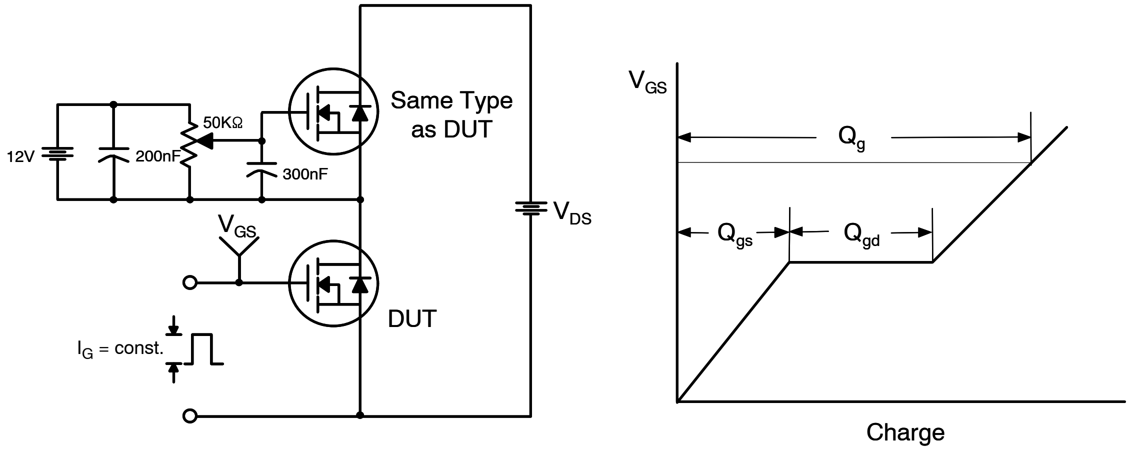


Figure 12. Gate Charge Test Circuit & Waveform

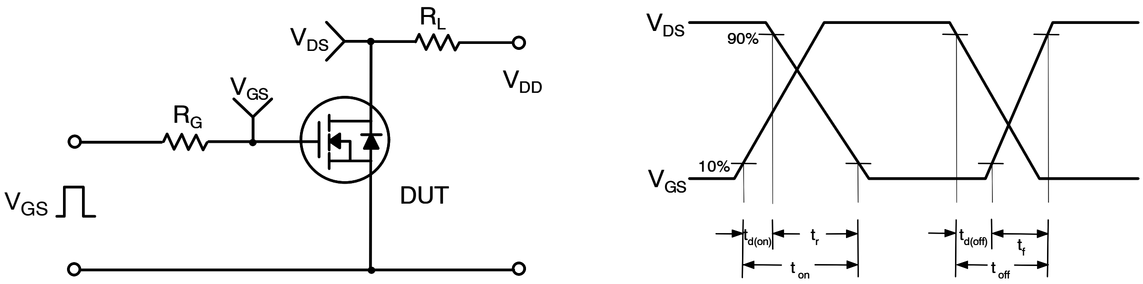
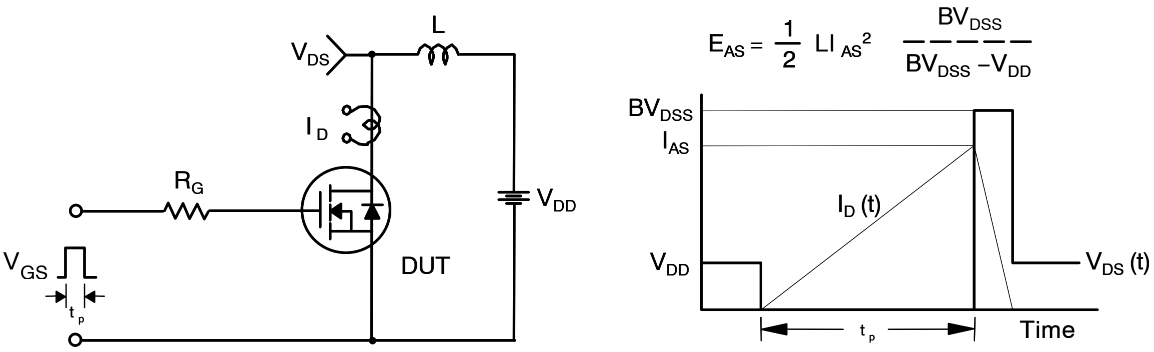


Figure 13. Resistive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

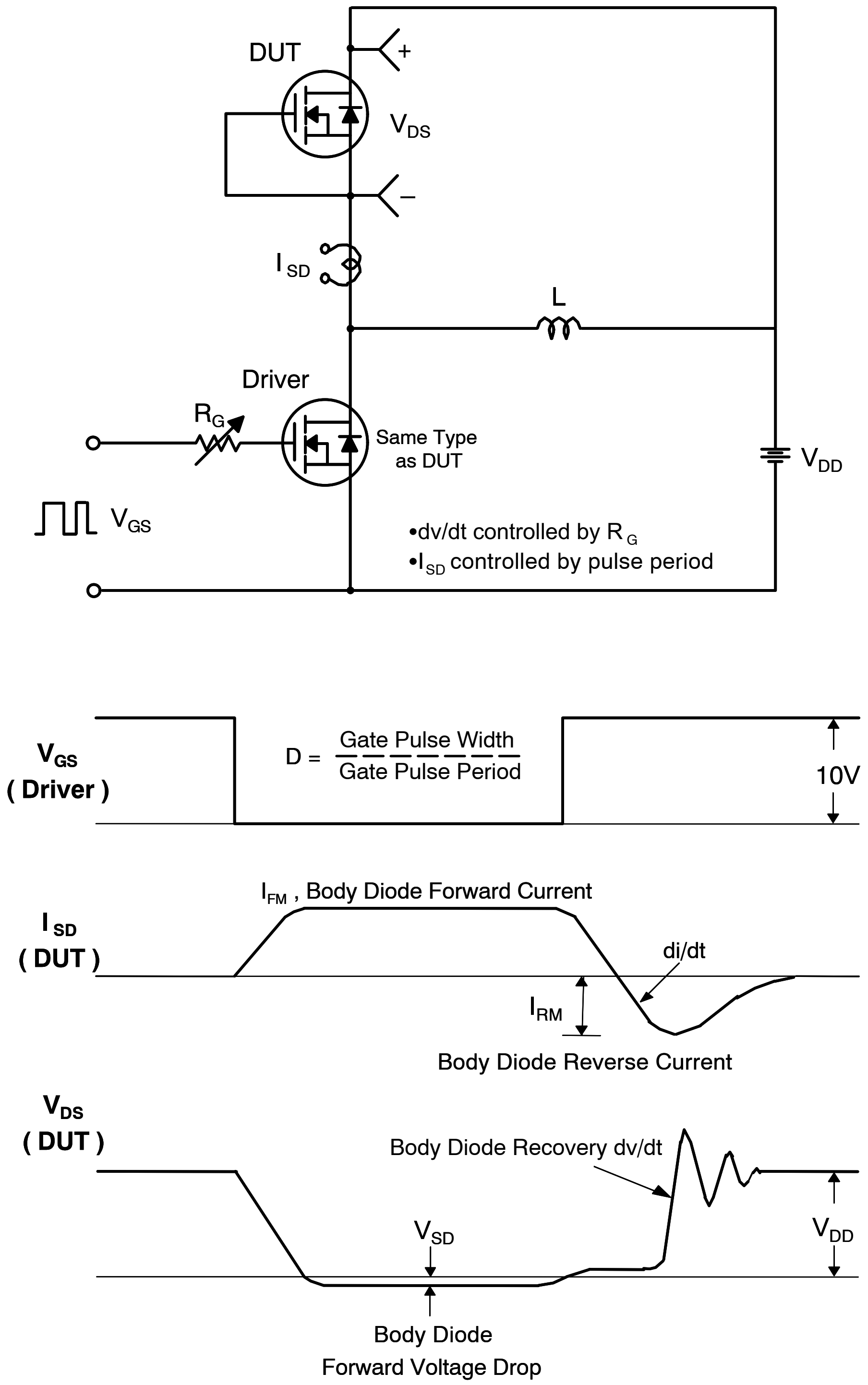


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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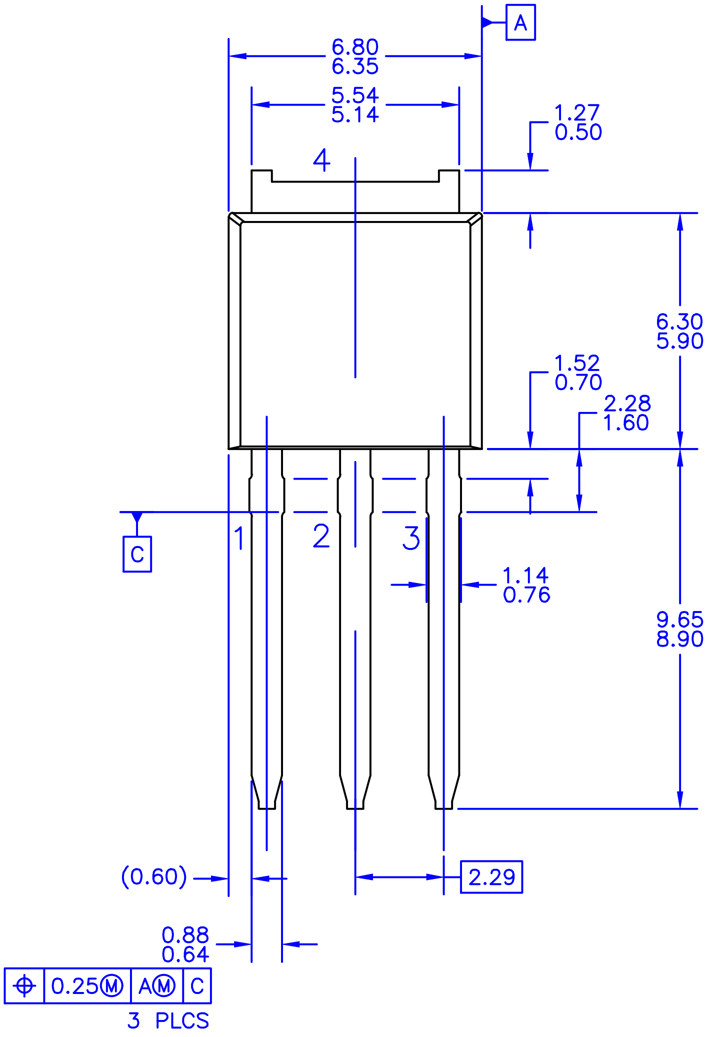

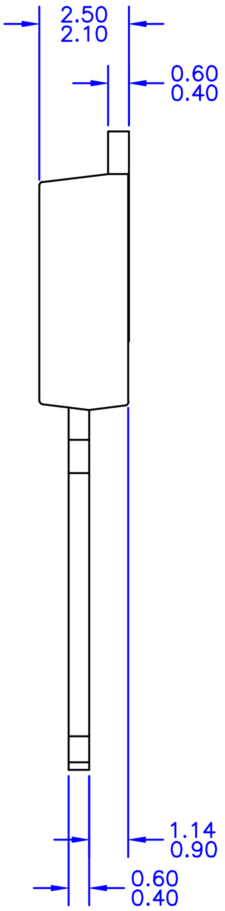

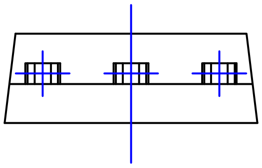

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