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# FQP17P10

## P-Channel QFET<sup>®</sup> MOSFET

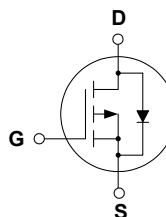
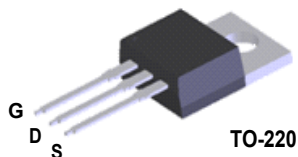
- 100 V, - 16.5 A, 190 mΩ

### Description

This P-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor<sup>®</sup>'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, audio amplifier, DC motor control, and variable switching power applications.

### Features

- -16.5 A, -100 V,  $R_{DS(on)} = 190 \text{ m}\Omega$  (Max.) @  $V_{GS} = -10 \text{ V}$ ,  $I_D = -8.25 \text{ A}$
- Low Gate Charge (Typ. 30 nC)
- Low Crss (Typ. 100 pF)
- 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating



### Absolute Maximum Ratings T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	FQP17P10	Unit
V <sub>DSS</sub>	Drain-Source Voltage	-100	V
I <sub>D</sub>	Drain Current	- Continuous (T <sub>C</sub> = 25°C)	-16.5
		- Continuous (T <sub>C</sub> = 100°C)	-11.7
I <sub>DM</sub>	Drain Current - Pulsed (Note 1)	-66	A
V <sub>GSS</sub>	Gate-Source Voltage	± 30	V
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)	580	mJ
I <sub>AR</sub>	Avalanche Current (Note 1)	-16.5	A
E <sub>AR</sub>	Repetitive Avalanche Energy (Note 1)	10	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	-6.0	V/ns
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> = 25°C)	100	W
		- Derate above 25°C	0.67
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +175	°C
T <sub>L</sub>	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

### Thermal Characteristics

Symbol	Parameter	FQP17P10	Unit
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case, Max.	1.5	°C/W
R <sub>θCS</sub>	Thermal Resistance, Case-to-Sink, Typ.	0.5	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient, Max.	62.5	°C/W

### Electrical Characteristics

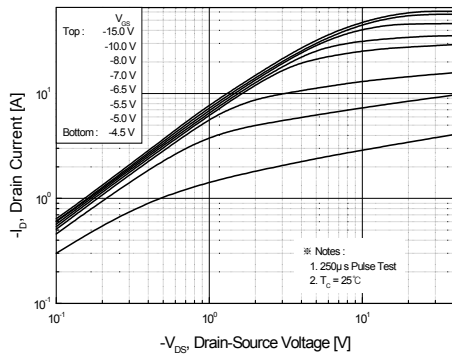
T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-100	--	--	V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = -250 μA, Referenced to 25°C	--	-0.1	--	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -100 V, V <sub>GS</sub> = 0 V	--	--	-1	μA
		V <sub>DS</sub> = -80 V, T <sub>C</sub> = 150°C	--	--	-10	μA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V	--	--	-100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = 30 V, V <sub>DS</sub> = 0 V	--	--	100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-2.0	--	-4.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -8.25 A	--	0.14	0.19	Ω
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = -40 V, I <sub>D</sub> = -8.25 A	--	9.9	--	S
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz	--	850	1100	pF
C <sub>oss</sub>	Output Capacitance		--	310	400	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	100	130	pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = -50 V, I <sub>D</sub> = -16.5 A, R <sub>G</sub> = 25 Ω  (Note 4)	--	17	45	ns
t <sub>r</sub>	Turn-On Rise Time		--	200	410	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	45	100	ns
t <sub>f</sub>	Turn-Off Fall Time		--	100	210	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -80 V, I <sub>D</sub> = -16.5 A, V <sub>GS</sub> = -10 V  (Note 4)	--	30	39	nC
Q <sub>gs</sub>	Gate-Source Charge		--	4.8	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	17	--	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current		--	--	-16.5	A
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current		--	--	-66	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -16.5 A	--	--	-4.0	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -16.5 A,	--	120	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di <sub>F</sub> / dt = 100 A/μs	--	0.52	--	μC

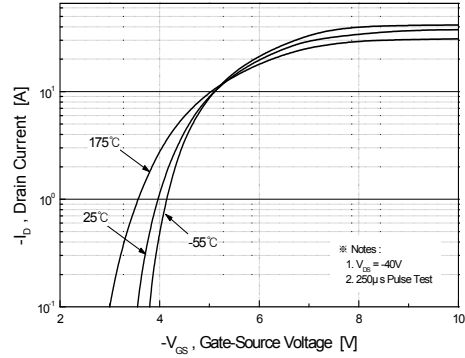
**Notes:**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 3.2mH, I<sub>AS</sub> = -16.5A, V<sub>DD</sub> = -25V, R<sub>G</sub> = 25 Ω, Starting T<sub>J</sub> = 25°C
3. I<sub>SD</sub> ≤ -16.5A, di/dt ≤ 300A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C
4. Essentially independent of operating temperature

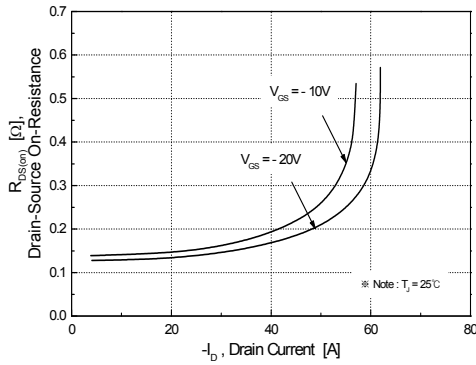
**Typical Characteristics**



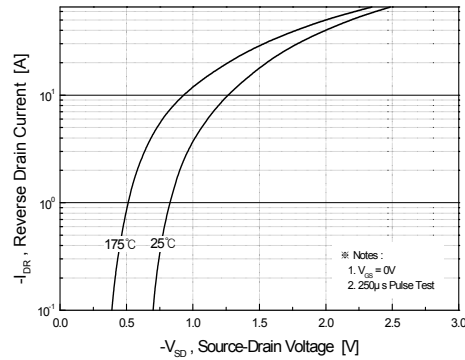
**Figure 1. On-Region Characteristics**



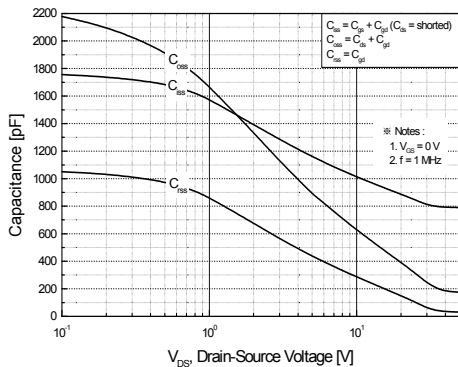
**Figure 2. Transfer Characteristics**



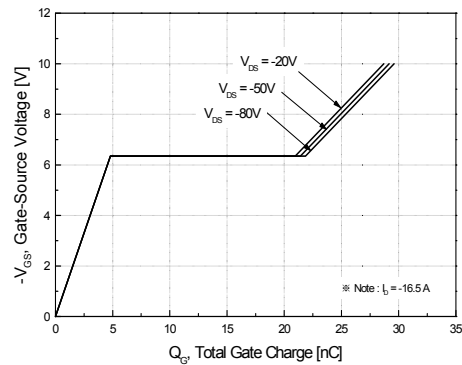
**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**



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



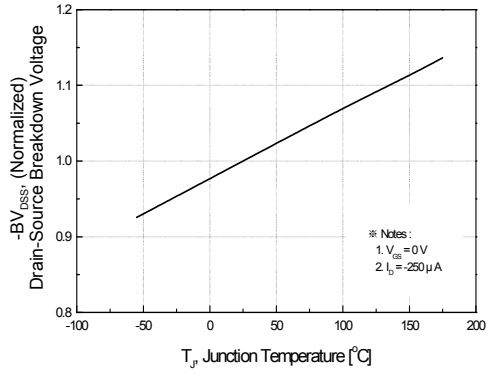
**Figure 5. Capacitance Characteristics**



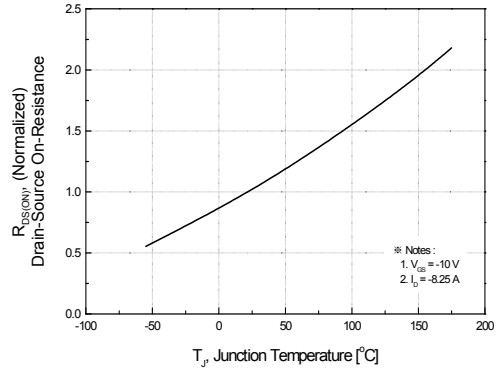
**Figure 6. Gate Charge Characteristics**

Dimensions in Millimeters

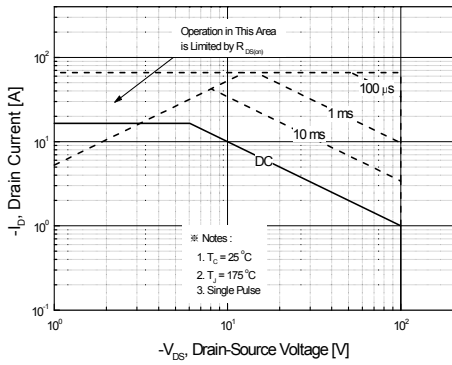
**Typical Characteristics** (Continued)



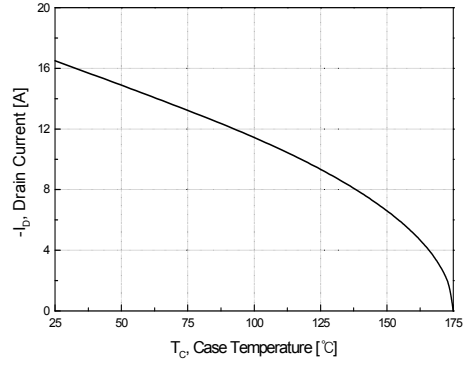
**Figure 7. Breakdown Voltage Variation vs. Temperature**



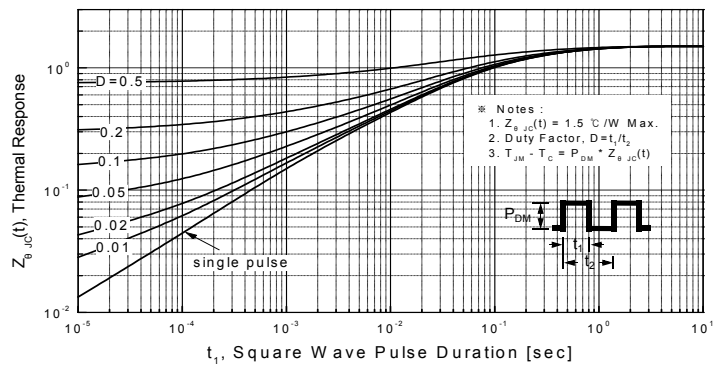
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**

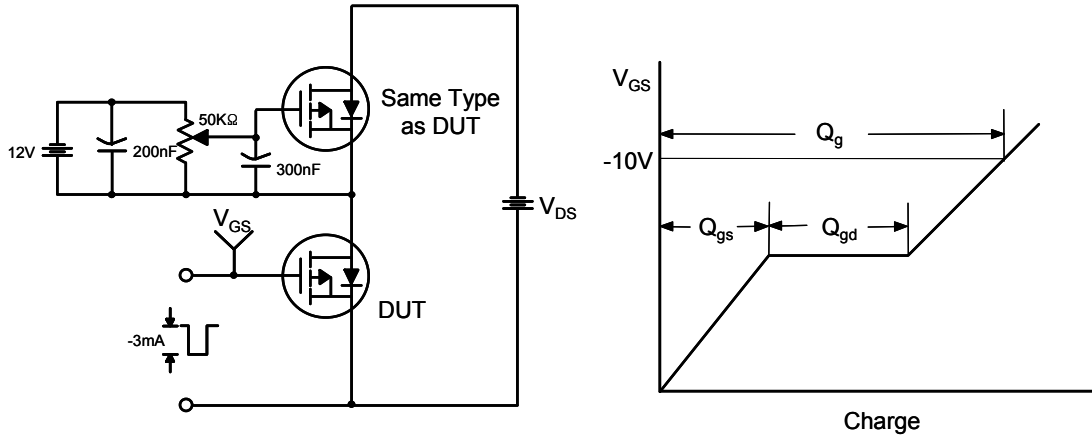


**Figure 10. Maximum Drain Current vs. Case Temperature**

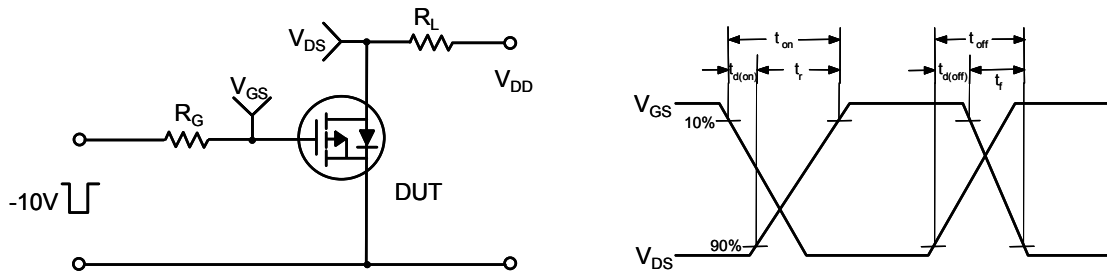


**Figure 11. Transient Thermal Response Curve**

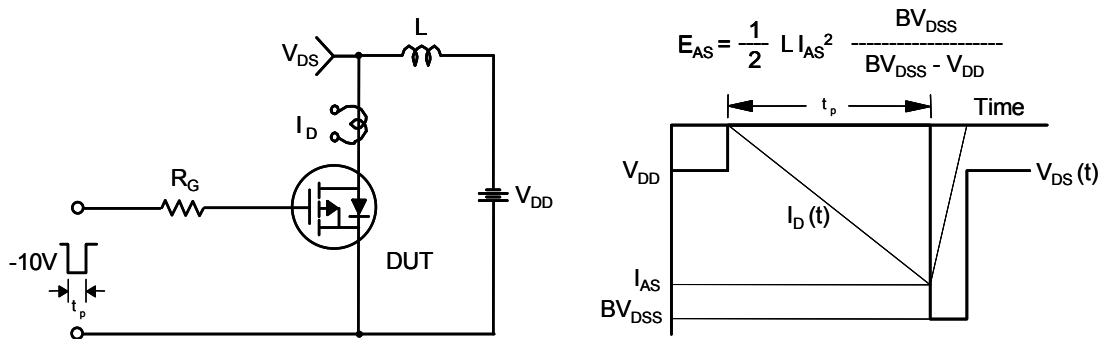
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**

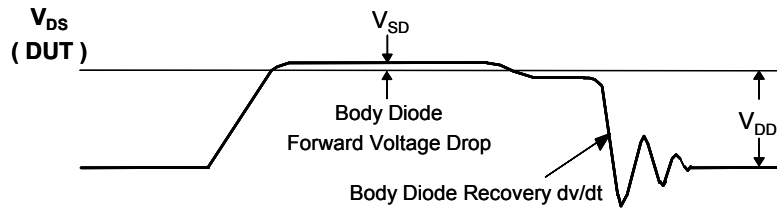
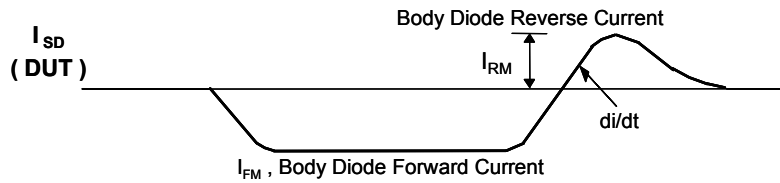
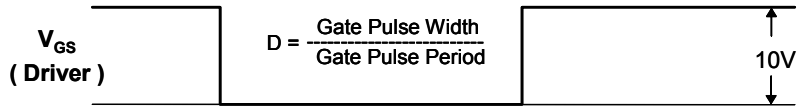
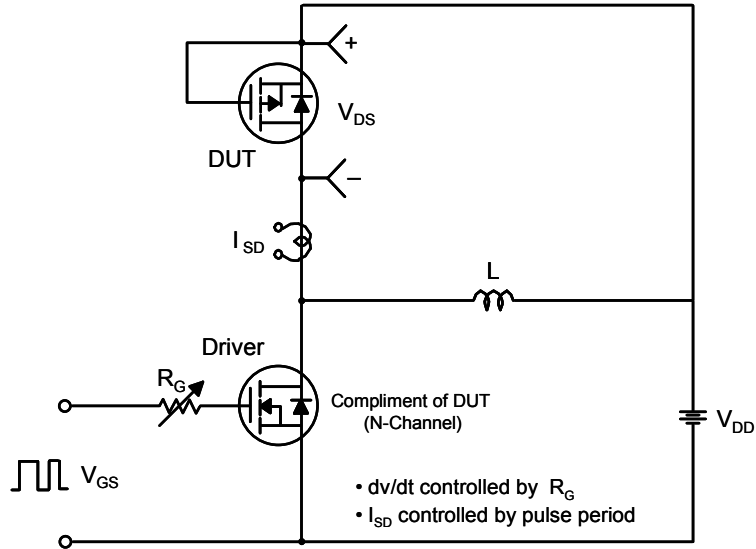


**Unclamped Inductive Switching Test Circuit & Waveforms**



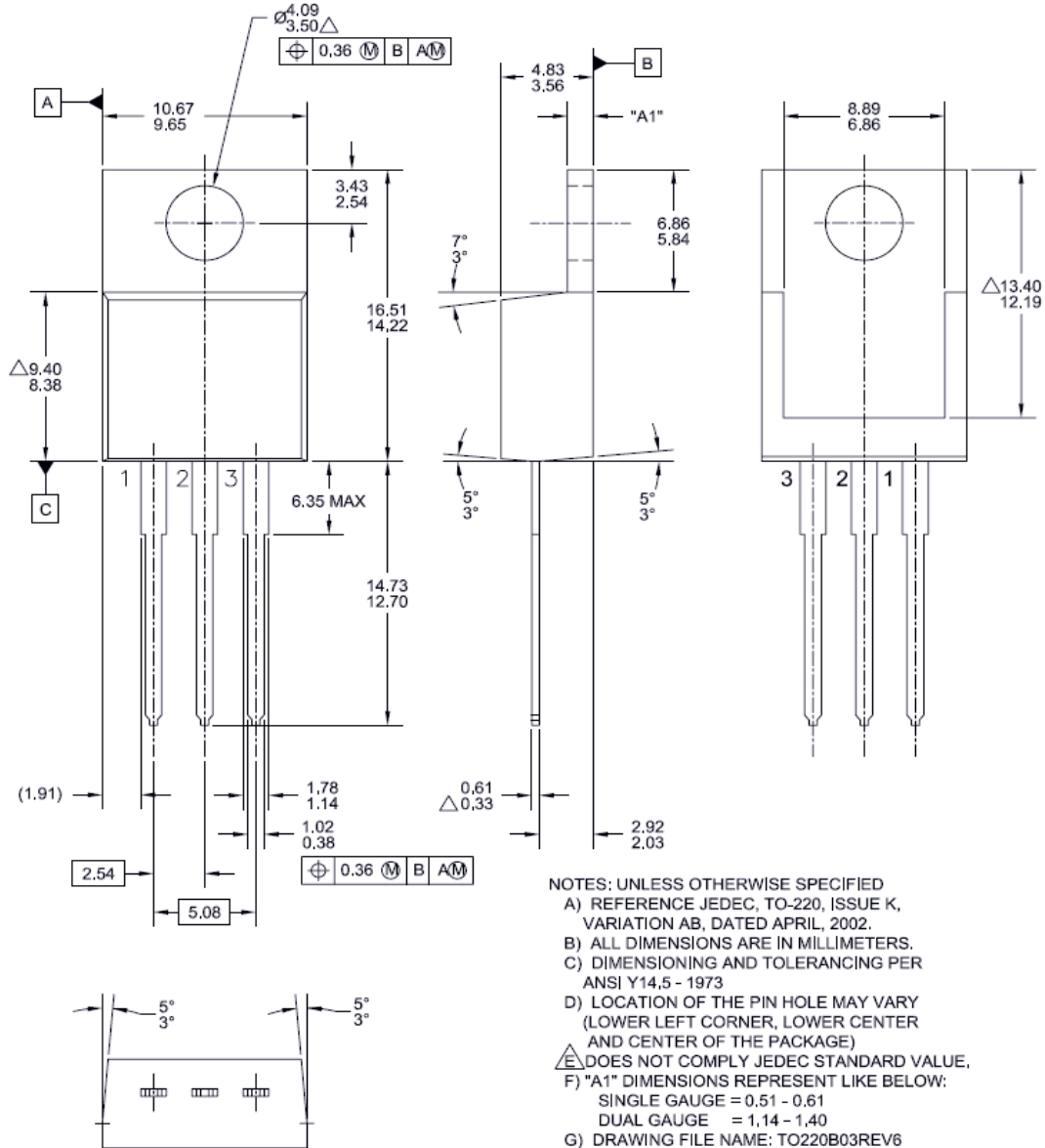
Dimensions in Millimeters

Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimensions

TO-220



- NOTES: UNLESS OTHERWISE SPECIFIED  
 A) REFERENCE JEDEC, TO-220, ISSUE K, VARIATION AB, DATED APRIL, 2002.  
 B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DIMENSIONING AND TOLERANCING PER ANSI Y14.5 - 1973  
 D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)  
 E) DOES NOT COMPLY JEDEC STANDARD VALUE.  
 F) "A1" DIMENSIONS REPRESENT LIKE BELOW:  
 SINGLE GAUGE = 0.51 - 0.61  
 DUAL GAUGE = 1.14 - 1.40  
 G) DRAWING FILE NAME: TO220B03REV6

Dimensions in Millimeters





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| AX-CAP®*                 | FRFET®  | Programmable Active Droop™ | TinyBoost™       |
| BitSiC™                  | Global Power ResourceSM                         | QFET®                      | TinyBuck™        |
| Build it Now™            | Green Bridge™                                   | QS™                        | TinyCalc™        |
| CorePLUS™                | Green FPS™                                      | Quiet Series™              | TinyLogic®       |
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