FAIRCHILD
SEMICONDUCTOR®

March 2013

FDP150N10

N-Channel PowerTrench® MOSFET

100 V, 57 A, 15 mΩ

Features

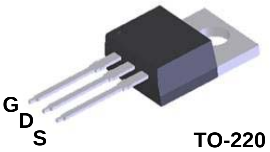
- $R_{DS(on)}$ = 12 mΩ (Typ.) @ V_{GS} = 10 V, I_D = 49 A
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

General Description

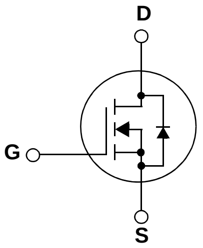
This N-Channel MOSFET is produced using Fairchild Semiconductor®'s PowerTrench® process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor drives and Uninterruptible Power Supplies
- Micro Solar Inverter



TO-220



MOSFET Maximum Ratings $T_C = 25^oC$ unless otherwise noted

Symbol	Parameter		FDP150N10	Unit
V_{DSS}	Drain to Source Voltage		100	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current	-Continuous ($T_C = 25^oC$)	57	A
		-Continuous ($T_C = 100^oC$)	40	A
I_{DM}	Drain Current	- Pulsed (Note 1)	228	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		132	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		7.5	V/ns
P_D	Power Dissipation	($T_C = 25^oC$)	110	W
		- Derate above 25°C	0.88	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	°C

Thermal Characteristics

Symbol	Parameter	FDP150N10	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.13	°C/W
$R_{\theta CS}$	Thermal Resistance, Case to Sink Typ.	0.5	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

Package Marking and Ordering Information $T_C = 25^oC$ unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP150N10	FDP150N10	TO-220	-	-	50

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu A$, $V_{GS} = 0V$, $T_C= 25^oC$	100	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu A$, Referenced to 25^oC	-	0.1	-	$V/^oC$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 100V$, $V_{GS} = 0V$	-	-	1	μA
		$V_{DS} = 100V$, $V_{GS} = 0V$, $T_C = 150^oC$	-	-	500	
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20V$, $V_{DS} = 0V$	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu A$	2.5	-	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10V$, $I_D = 49A$	-	12	15	mΩ
g_{FS}	Forward Transconductance	$V_{DS} = 20V$, $I_D = 49A$	-	156	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25V$, $V_{GS} = 0V$ f = 1MHz	-	3580	4760	pF
C_{oss}	Output Capacitance		-	340	450	pF
C_{rss}	Reverse Transfer Capacitance		-	140	210	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50V$, $I_D = 49A$ $V_{GS} = 10V$, $R_{GEN} = 25\Omega$ (Note 4)	-	47	104	ns
t_r	Turn-On Rise Time		-	164	338	ns
$t_{d(off)}$	Turn-Off Delay Time		-	86	182	ns
t_f	Turn-Off Fall Time		-	83	176	ns
$Q_{g(tot)}$	Total Gate Charge at 10V	$V_{DS} = 80V$, $I_D = 49A$ $V_{GS} = 10V$ (Note 4)	-	53	69	nC
Q_{gs}	Gate to Source Gate Charge		-	19	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	15	-	nC
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	57	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	228	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0V$, $I_{SD} = 49A$	-	-	1.3	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0V$, $I_{SD} = 49A$ $dI_F/dt = 100A/\mu s$	-	41	-	ns
Q_{rr}	Reverse Recovery Charge		-	70	-	nC

Notes:

1: Repetitive Rating: Pulse width limited by maximum junction temperature
2: $L = 0.11mH$, $I_{AS} = 49A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25°C$
3: $I_{SD} \leq 49A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25°C$
4: Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

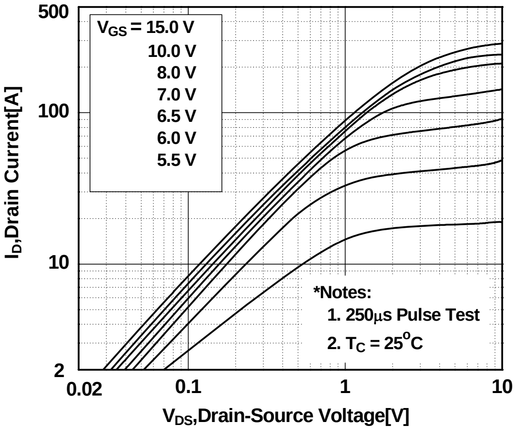


Figure 2. Transfer Characteristics

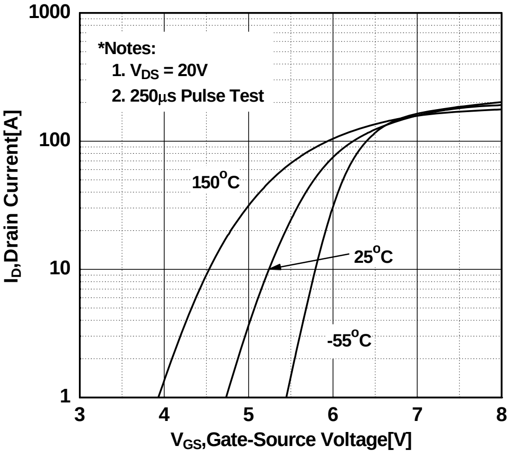


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

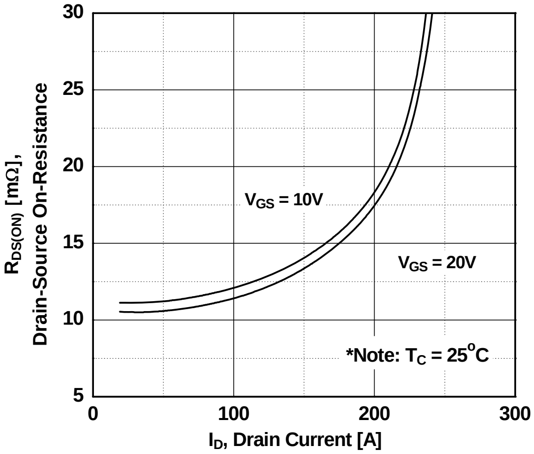


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

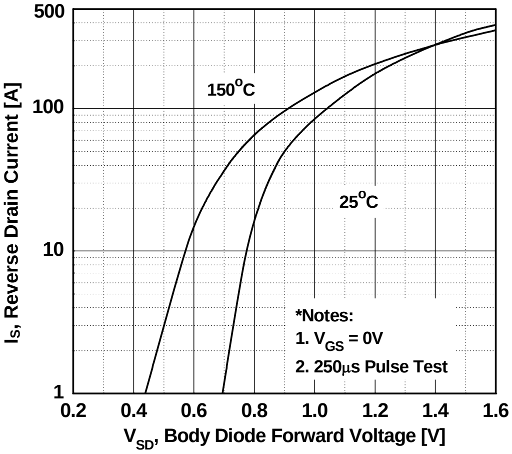


Figure 5. Capacitance Characteristics

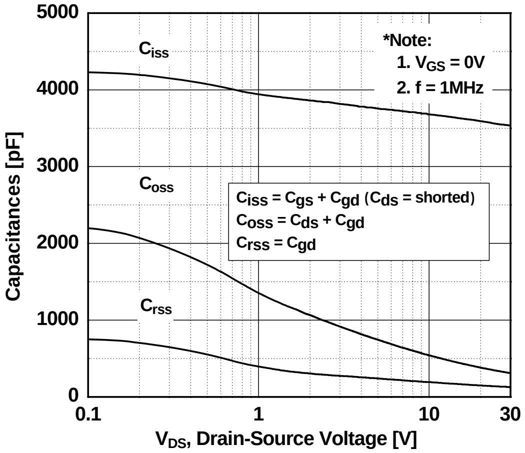
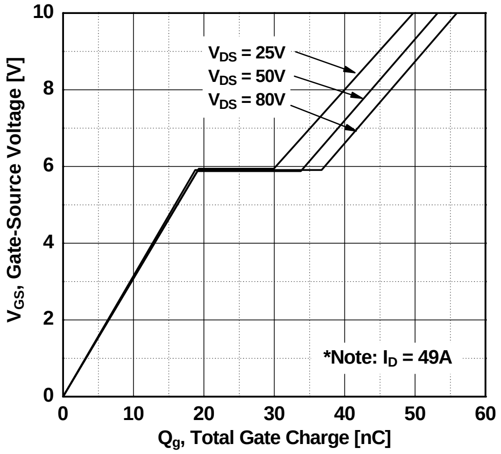


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

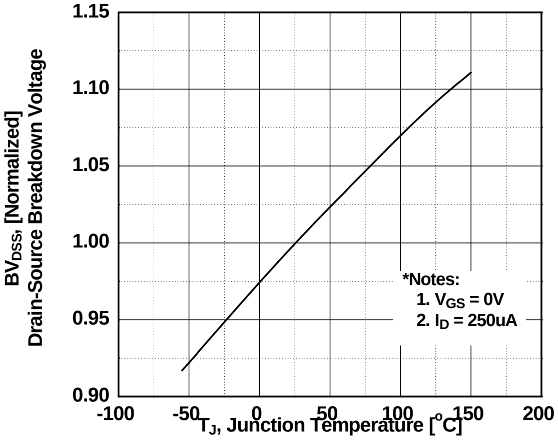


Figure 8. On-Resistance Variation vs. Temperature

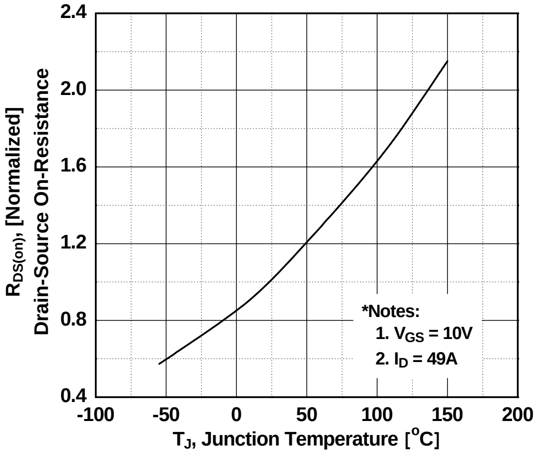


Figure 9. Maximum Safe Operating Area

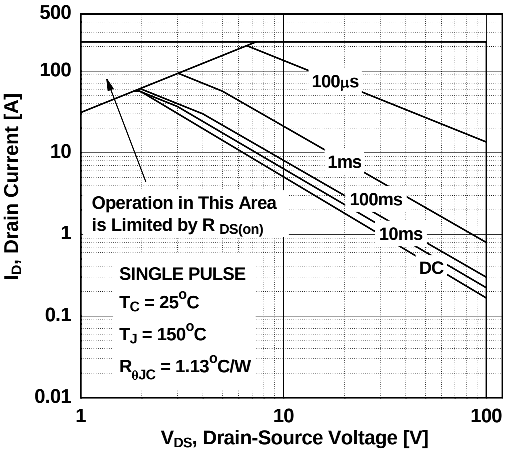


Figure 10. Maximum Drain Current vs. Case Temperature

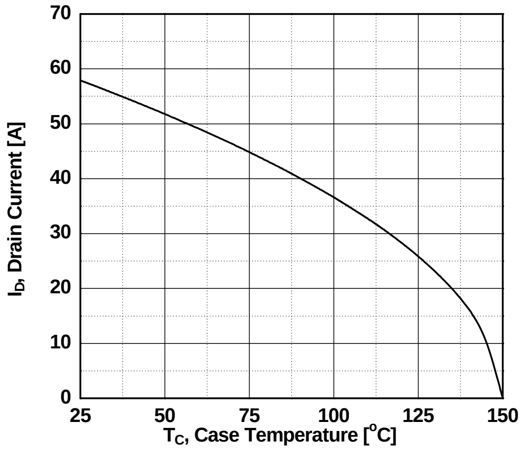
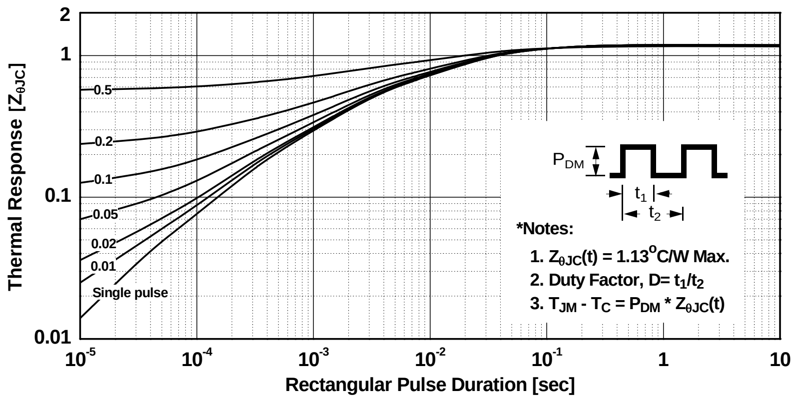
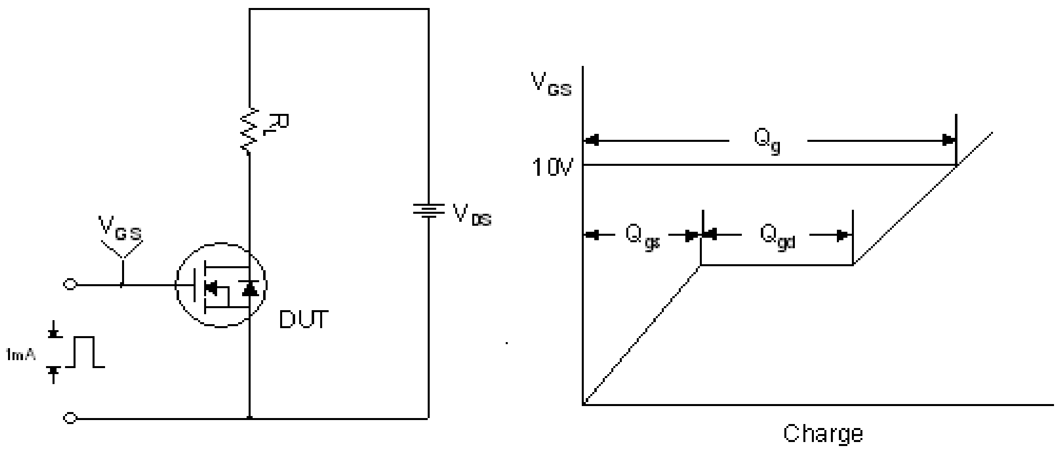


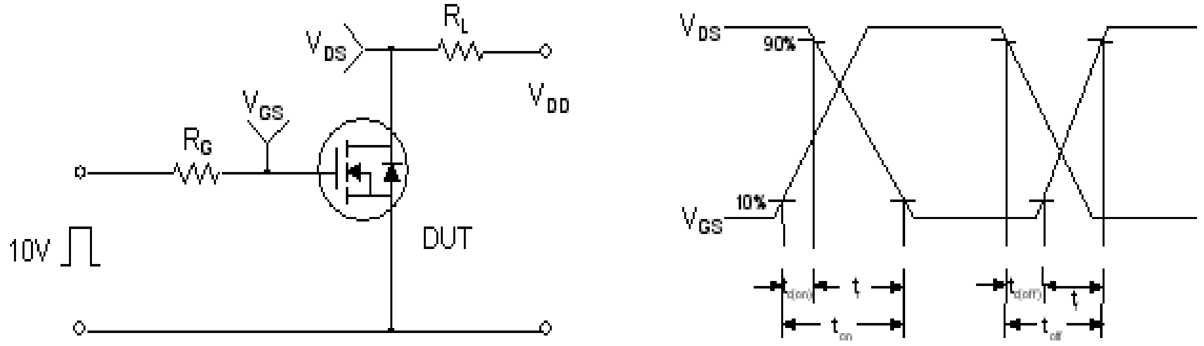
Figure 11. Transient Thermal Response Curve



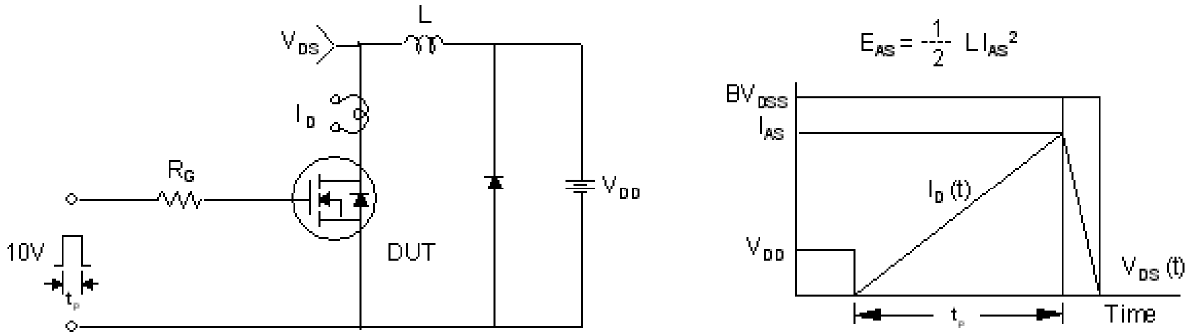
Gate Charge Test Circuit & Waveform



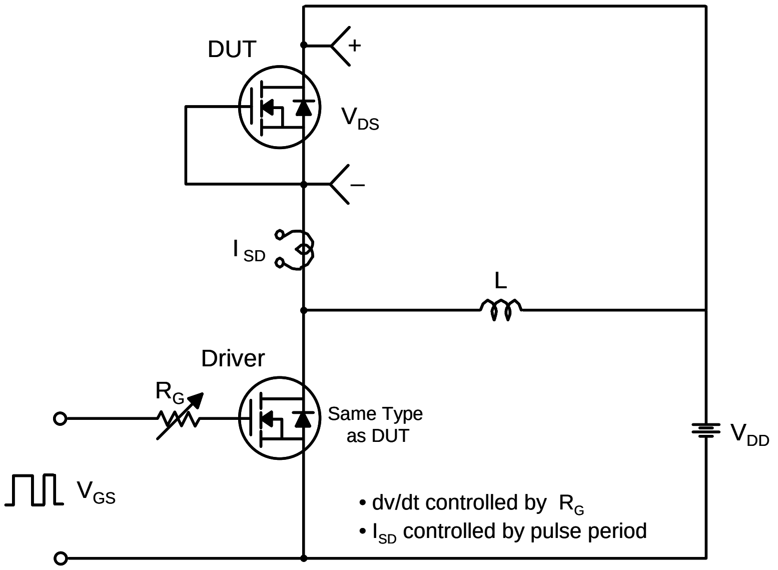
Resistive Switching Test Circuit & Waveforms



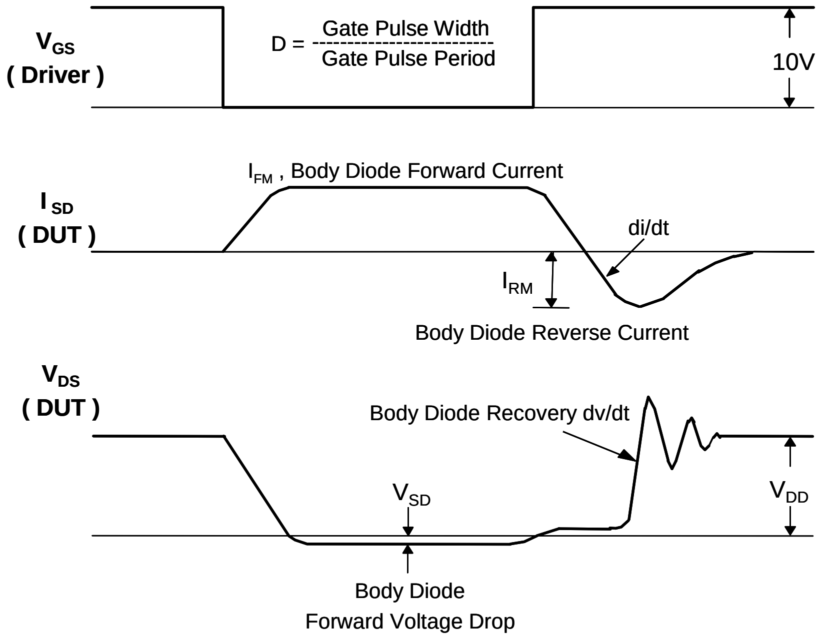
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

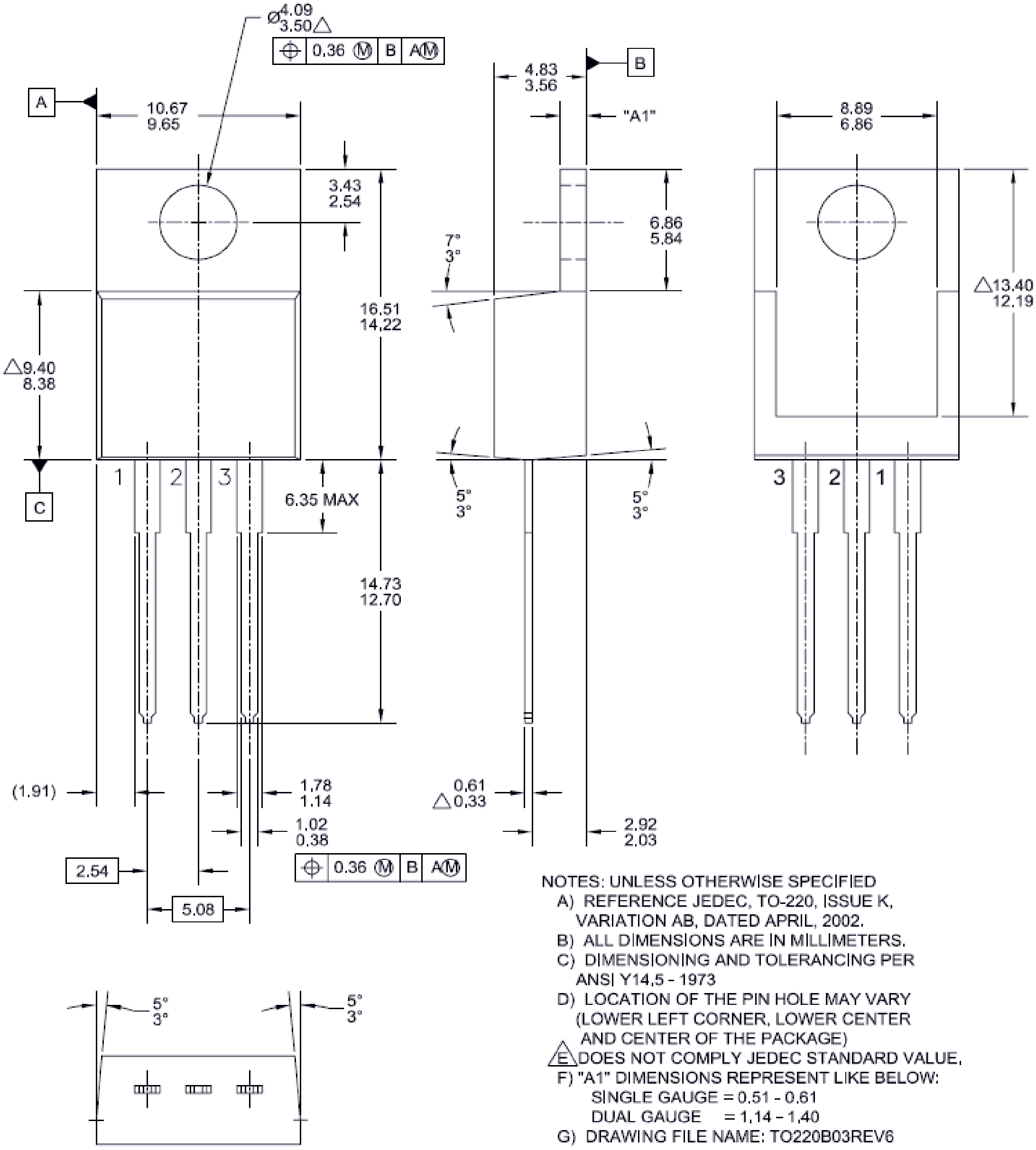


- dv/dt controlled by R_G
- I_{SD} controlled by pulse period



Mechanical 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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