FAIRCHILD SEMICONDUCTOR®

September 2007

UniFET™

FDP80N06

N-Channel MOSFET

60V, 80A, 10mΩ

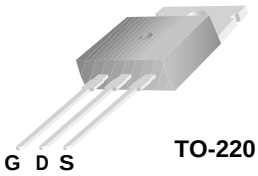
Features

- $R_{DS(on)}$ = 8.5mΩ (Typ.)@ V_{GS} = 10V, I_D = 40A
- Low gate charge(Typ. 57nC)
- Low C_{rss}(Typ. 145pF)
- Fast switching
- Improved dv/dt capability
- RoHS compliant

Description

These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar stripe, DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pluse in the avalanche and commutation mode. These devices are well suited for high efficient switched mode power supplies,active power factor correction, electronic lamp ballast based on half bridge topology.



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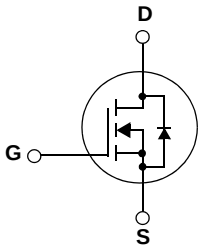


MOSFET Maximum Ratings T_C = 25°C unless otherwise noted*

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage		60	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current	-Continuous (T_C = 25°C)	80	A
		-Continuous (T_C = 100°C)	65	
I_{DM}	Drain Current	- Pulsed (Note 1)	320	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	480	mJ
I_{AR}	Avalanche Current	(Note 1)	80	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	17.6	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5	V/ns
P_D	Power Dissipation	(T_C = 25°C)	176	W
		- Derate above 25°C	1.17	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +175	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	°C

*Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.85	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	

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

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP80N06	FDP80N06	TO-220	-	-	50

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V, $T_J = 25^oC$	60	-	-	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25^oC	-	0.075	-	$V/^oC$
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 48V, $T_C = 150^oC$	-	-	10	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, I_D = 250μA	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 40A	-	8.5	10	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 25V, I_D = 40A (Note 4)	-	67	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	2450	3190	pF
C_{oss}	Output Capacitance		-	910	1190	pF
C_{rss}	Reverse Transfer Capacitance		-	145	190	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30V, I_D = 80A, R_G = 25Ω (Note 4, 5)	-	32	75	ns
t_r	Turn-On Rise Time		-	259	528	ns
$t_{d(off)}$	Turn-Off Delay Time		-	136	282	ns
t_f	Turn-Off Fall Time		-	113	236	ns
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 48V, I_D = 80A, V_{GS} = 10V (Note 4, 5)	-	57	74	nC
Q_{gs}	Gate to Source Gate Charge		-	15	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	24	-	nC
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	80	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	320	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 80A	-	-	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 80A, dI_F/dt = 100A/μs (Note 4)	-	64	-	ns
Q_{rr}	Reverse Recovery Charge		-	127	-	nC

Notes:
1: Repetitive Rating: Pulse width limited by maximum junction temperature
2: L = 0.15mH, I_{AS} = 80A, V_{DD} = 50V, R_G = 25Ω, Starting $T_J = 25°C$
3: $I_{SD} \leq 80A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25°C$
4: Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5: Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

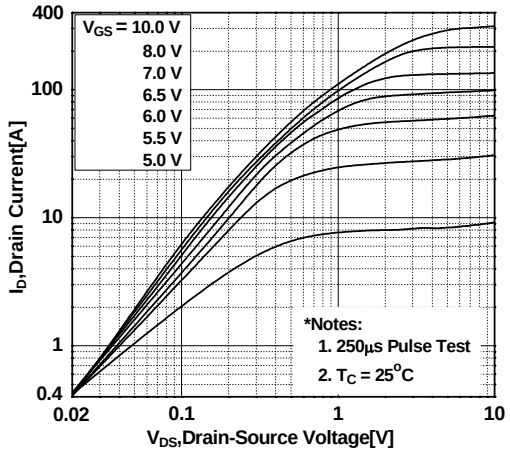


Figure 2. Transfer Characteristics

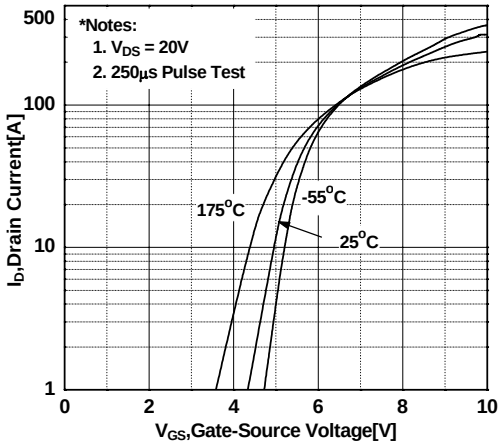


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

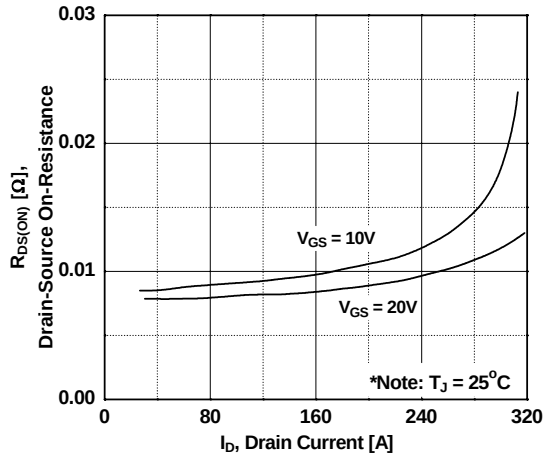


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

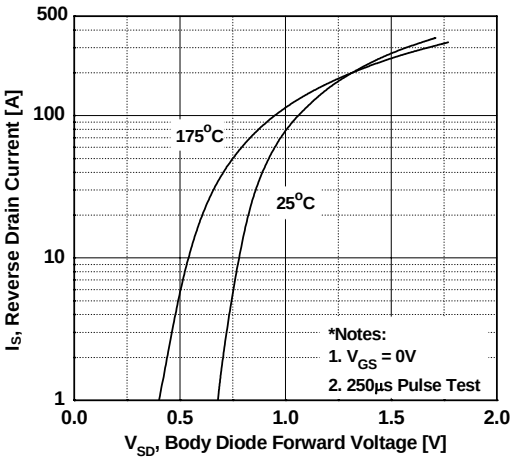


Figure 5. Capacitance Characteristics

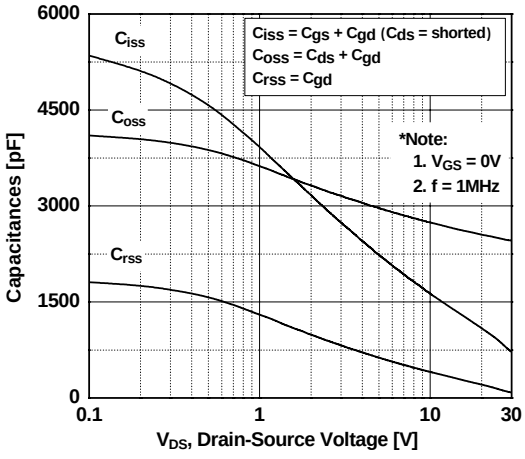
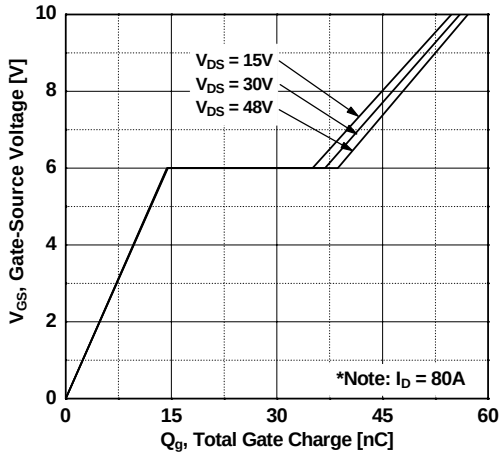


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

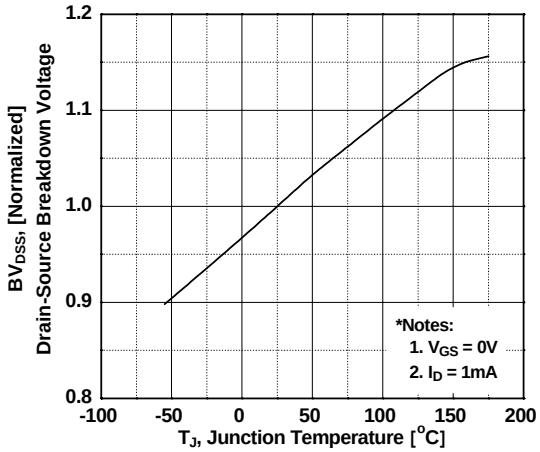


Figure 8. On-Resistance Variation vs. Temperature

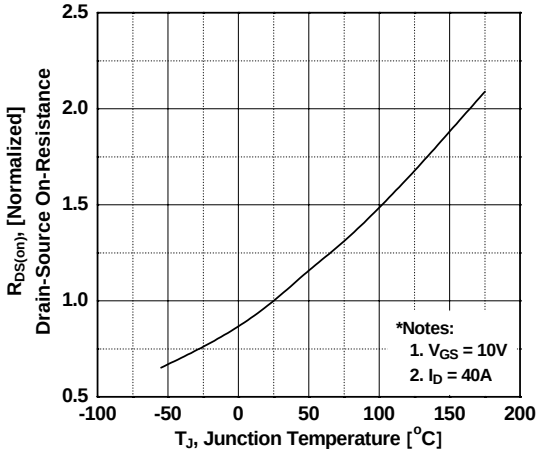


Figure 9. Maximum Safe Operating Area

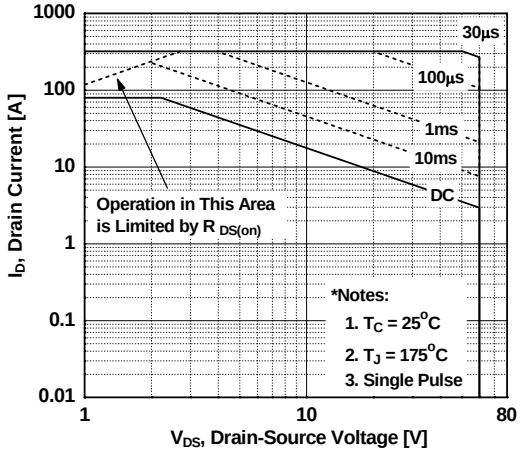


Figure 10. Maximum Drain Current vs. Case Temperature

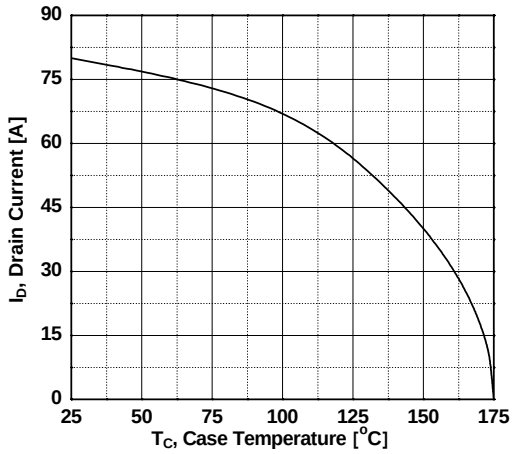
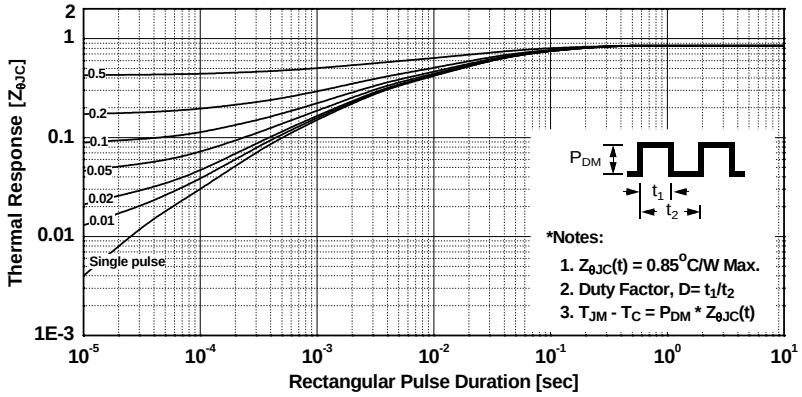
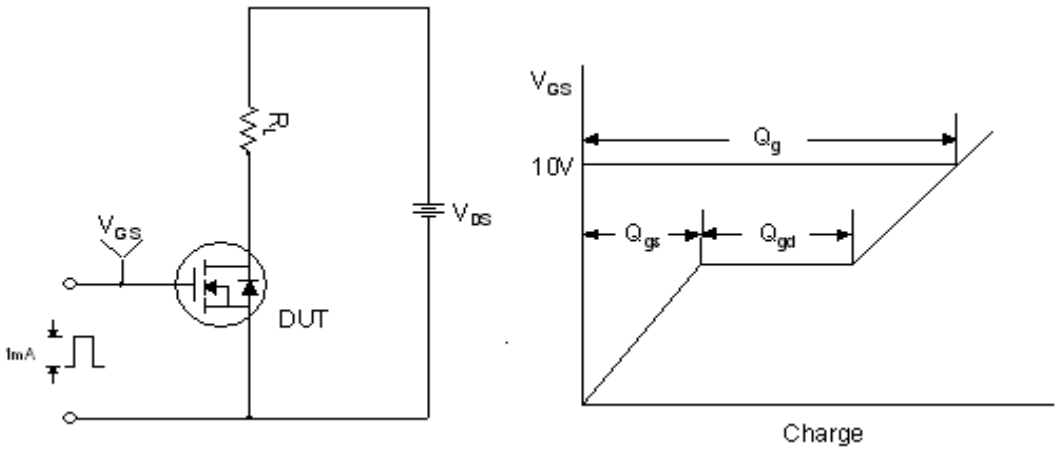


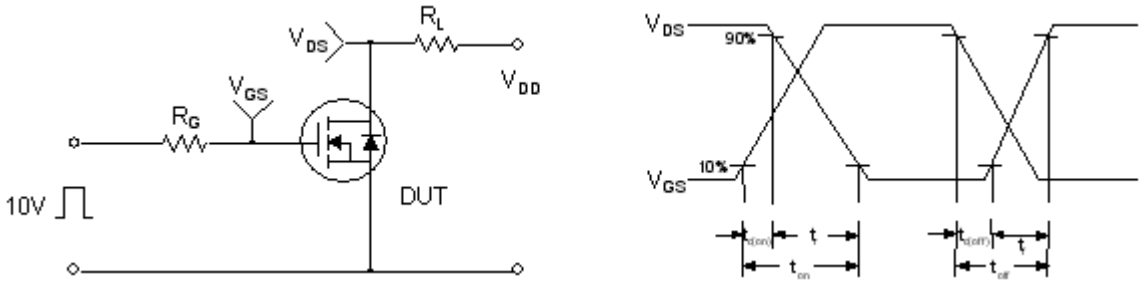
Figure 11. Transient Thermal Response Curve



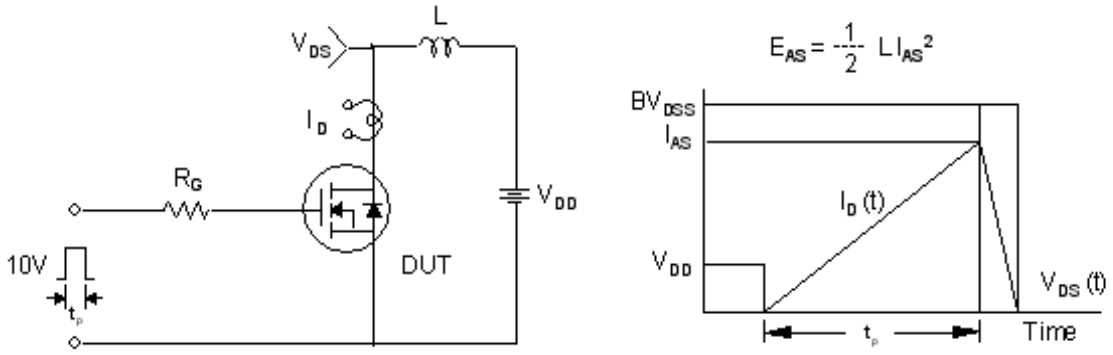
Gate Charge Test Circuit & Waveform



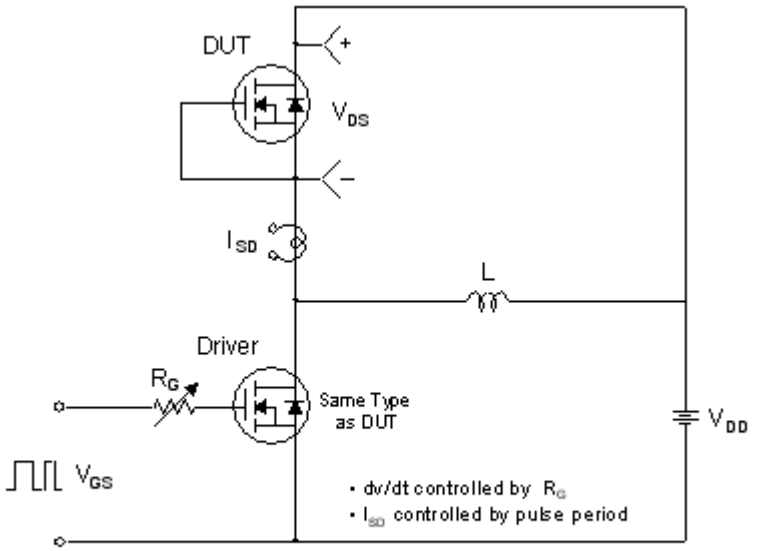
Resistive Switching Test Circuit & Waveforms

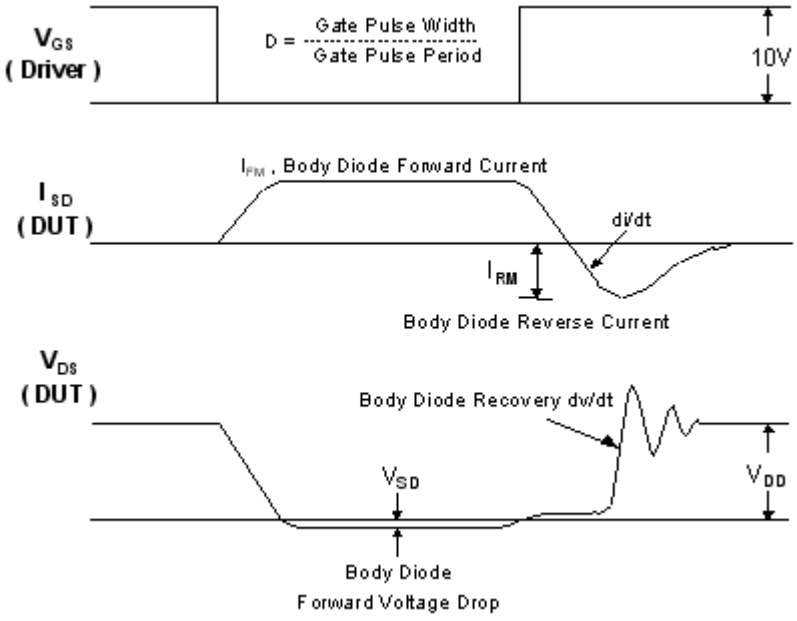


Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms





Mechanical Dimensions

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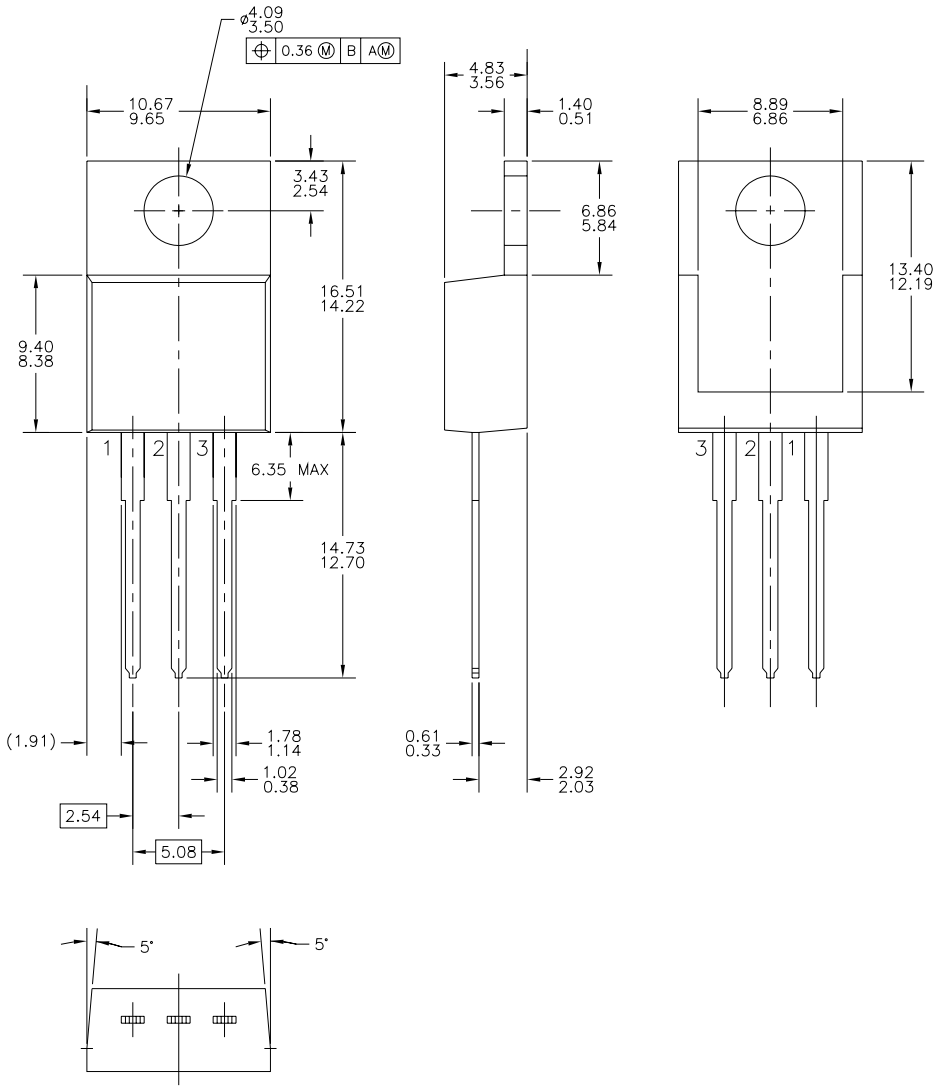

Dimensions in Millimeters

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