

FDP047AN08A0 / FDH047AN08A0

N-Channel PowerTrench® MOSFET

75 V, 80 A, 4.7 mΩ

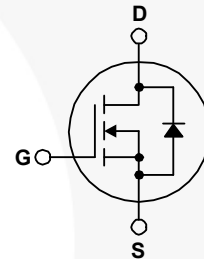
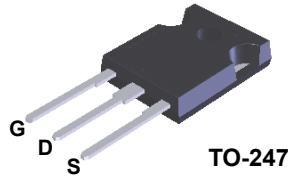
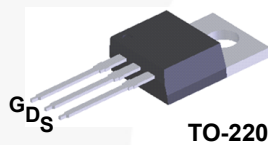
Features

- $R_{DS(ON)} = 4.0 \text{ m}\Omega$ (Typ.), $V_{GS} = 10 \text{ V}$, $I_D = 80 \text{ A}$
- $Q_g(\text{tot}) = 92 \text{ nC}$ (Typ.), $V_{GS} = 10 \text{ V}$
- Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)

Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies

Formerly developmental type 82684



MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	FDP047AN08A0 FDH047AN08A0	Unit
V_{DSS}	Drain to Source Voltage	75	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current		
	Continuous ($T_C < 144^\circ\text{C}$, $V_{GS} = 10 \text{ V}$)	80	A
	Continuous ($T_C = 25^\circ\text{C}$, $V_{GS} = 10 \text{ V}$, with $R_{\theta JA} = 62^\circ\text{C/W}$)	15	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 1)	475	mJ
P_D	Power dissipation	310	W
	Derate above 25°C	2.0	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case, Max. TO-220, TO-247	0.48	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient, Max. TO-220 (Note 2)	62	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient, Max. TO-247 (Note 2)	30	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP047AN08A0	FDP047AN08A0	TO-220	Tube	N/A	50 units
FDH047AN08A0	FDH047AN08A0	TO-247	Tube	N/A	30 units

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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Off Characteristics

B_{VDSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	75	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{V}$ $V_{GS} = 0\text{V}$ $T_C = 150^\circ\text{C}$	-	-	1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	± 100	nA

On Characteristics

$V_{GS(TH)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$	2	-	4	V
$r_{DS(ON)}$	Drain to Source On Resistance	$I_D = 80\text{A}$, $V_{GS} = 10\text{V}$	-	0.0040	0.0047	Ω
		$I_D = 37\text{A}$, $V_{GS} = 6\text{V}$	-	0.0058	0.0087	
		$I_D = 80\text{A}$, $V_{GS} = 10\text{V}$, $T_J = 175^\circ\text{C}$	-	0.0082	0.011	

Dynamic Characteristics

C_{ISS}	Input Capacitance	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$	-	6600	-	pF
C_{OSS}	Output Capacitance		-	1000	-	pF
C_{RSS}	Reverse Transfer Capacitance		-	240	-	pF
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0\text{V}$ to 10V	-	92	138	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0\text{V}$ to 2V	-	11	17	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DD} = 40\text{V}$ $I_D = 80\text{A}$ $I_g = 1.0\text{mA}$	-	27	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	16	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	21	-	nC
			-			

Switching Characteristics ($V_{GS} = 10\text{V}$)

t_{ON}	Turn-On Time	$V_{DD} = 40\text{V}$, $I_D = 80\text{A}$ $V_{GS} = 10\text{V}$, $R_{GS} = 3.3\Omega$	-	-	160	ns
$t_{d(ON)}$	Turn-On Delay Time		-	18	-	ns
t_r	Rise Time		-	88	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	40	-	ns
t_f	Fall Time		-	45	-	ns
t_{OFF}	Turn-Off Time		-	-	128	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 80\text{A}$	-	-	1.25	V
		$I_{SD} = 40\text{A}$	-	-	1.0	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 75\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	53	ns
Q_{RR}	Reverse Recovered Charge	$I_{SD} = 75\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	54	nC

Notes:

- 1: Starting $T_J = 25^\circ\text{C}$, $L = 0.232\text{mH}$, $I_{AS} = 64\text{A}$.
2: Pulse Width = 100s

Typical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

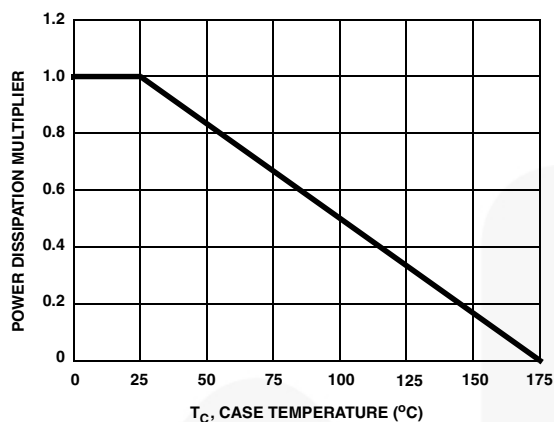


Figure 1. Normalized Power Dissipation vs Case Temperature

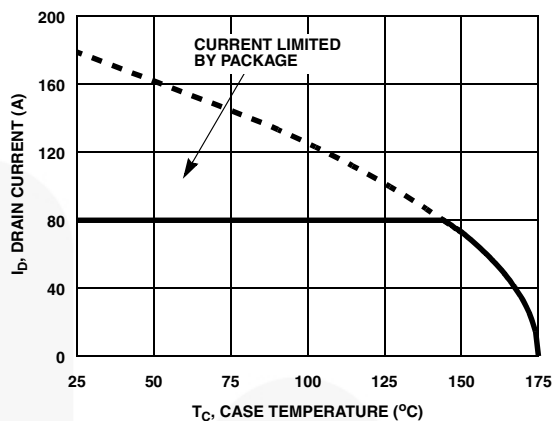


Figure 2. Maximum Continuous Drain Current vs Case Temperature

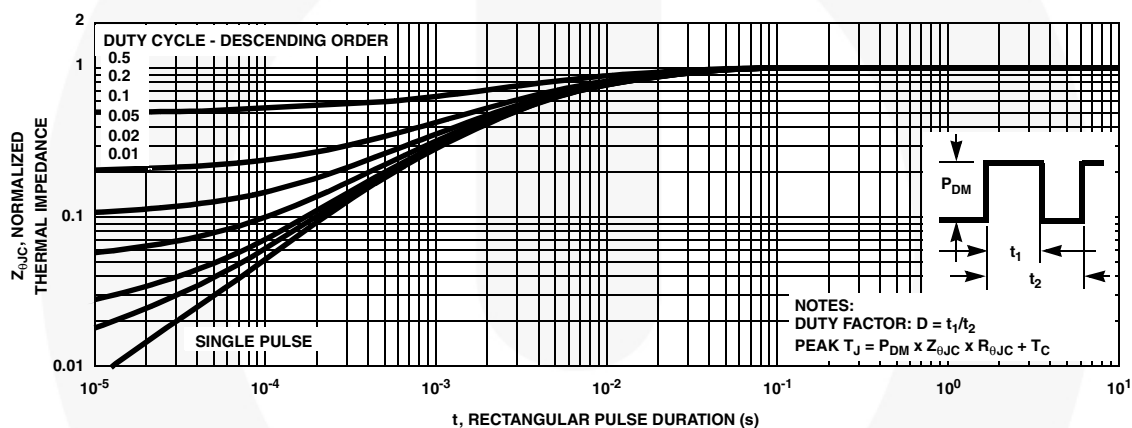


Figure 3. Normalized Maximum Transient Thermal Impedance

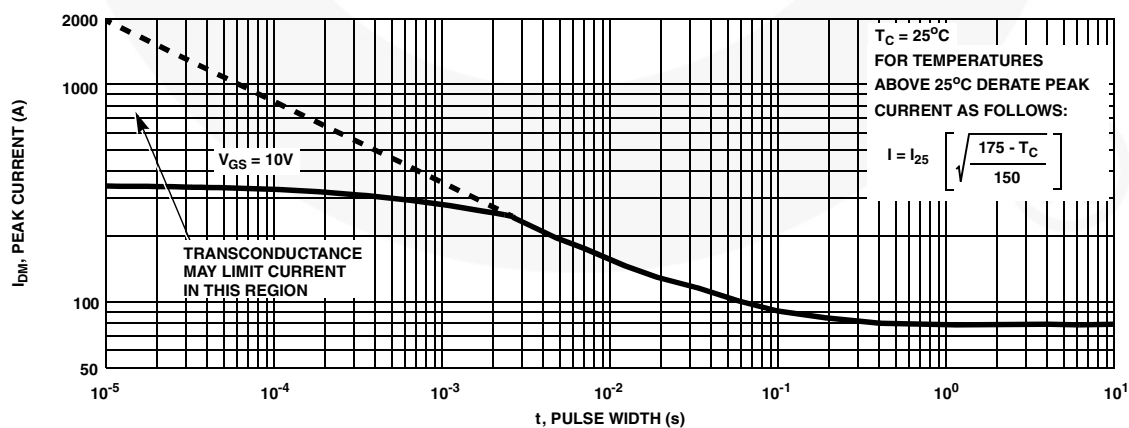


Figure 4. Peak Current Capability

Typical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

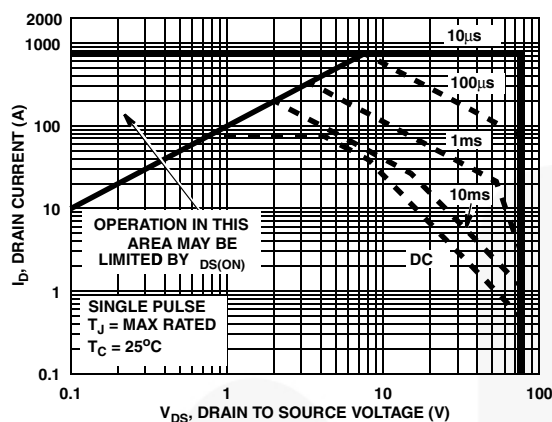
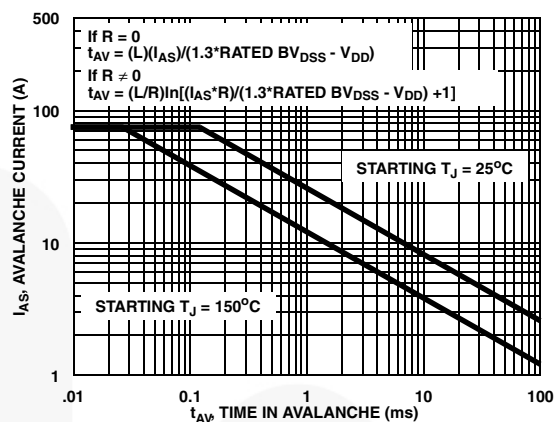


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515
Figure 6. Unclamped Inductive Switching Capability

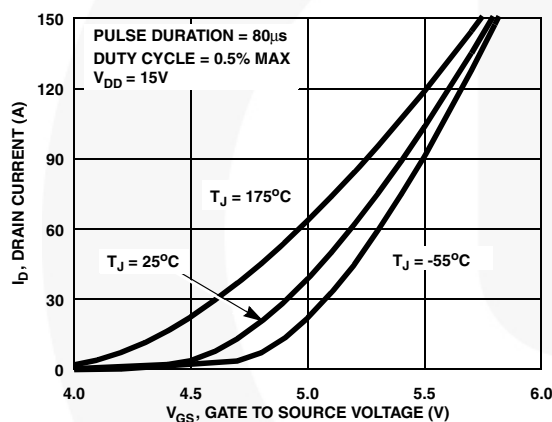


Figure 7. Transfer Characteristics

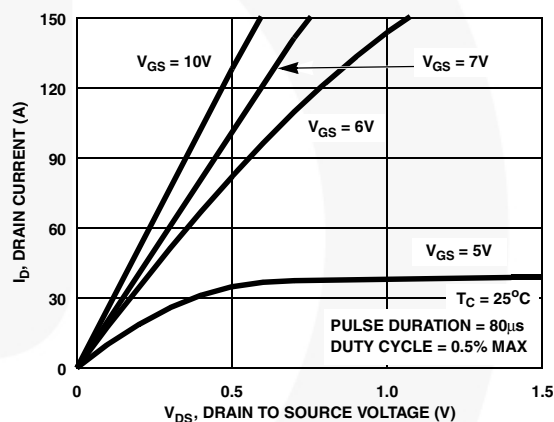


Figure 8. Saturation Characteristics

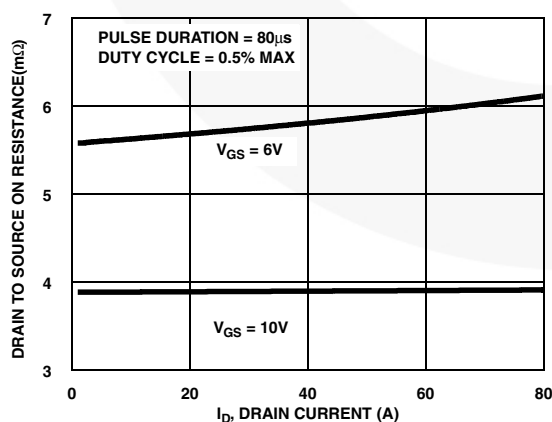


Figure 9. Drain to Source On Resistance vs Drain Current

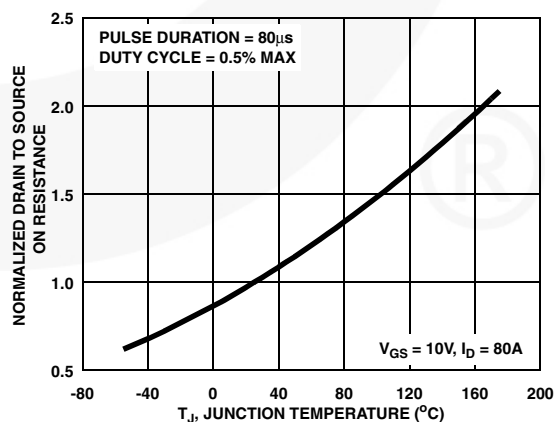


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

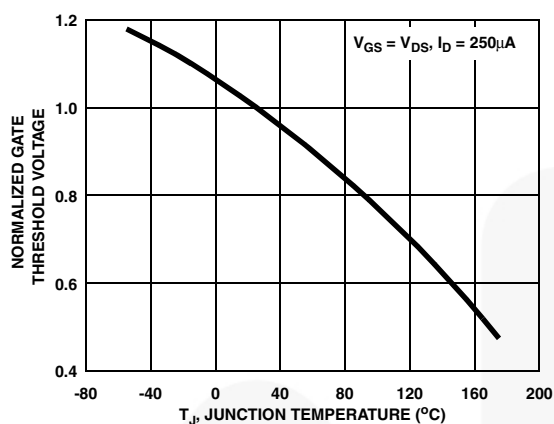


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

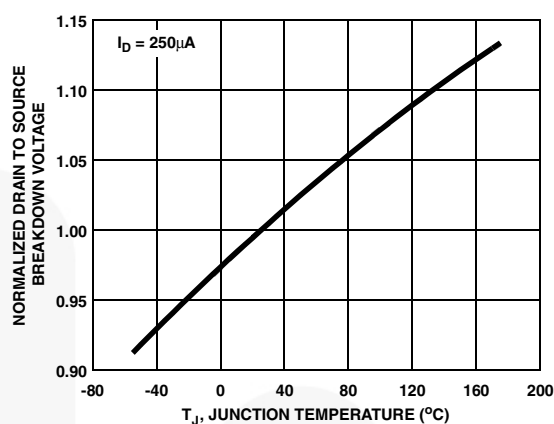


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

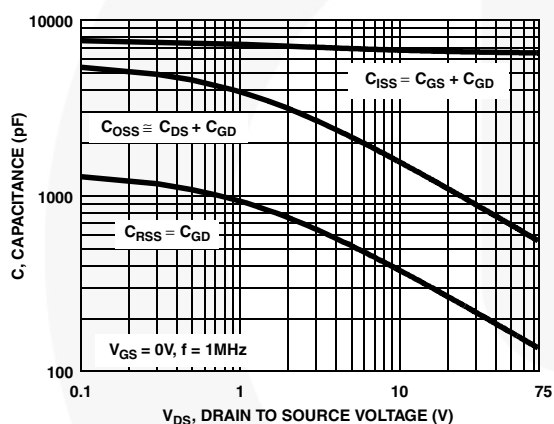


Figure 13. Capacitance vs Drain to Source Voltage

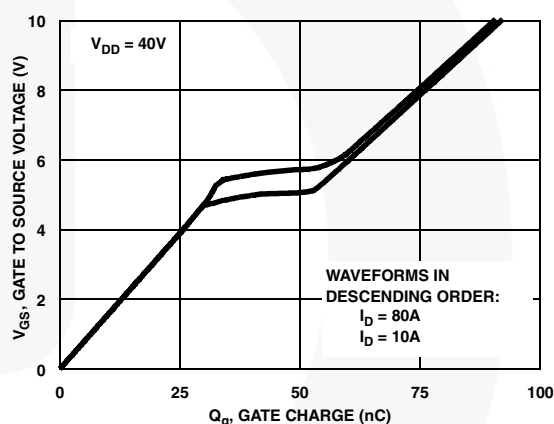


Figure 14. Gate Charge Waveforms for Constant Gate Currents

Test Circuits and Waveforms

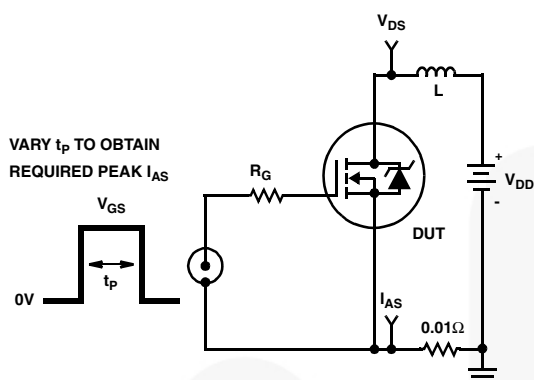


Figure 15. Unclamped Energy Test Circuit

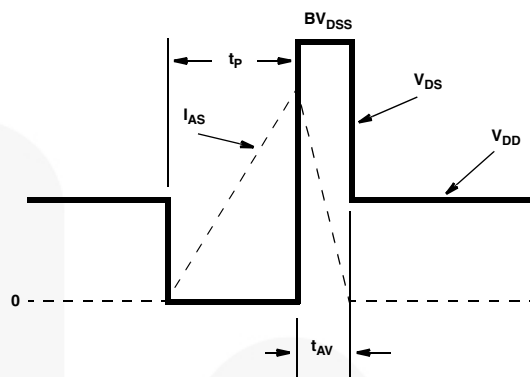


Figure 16. Unclamped Energy Waveforms

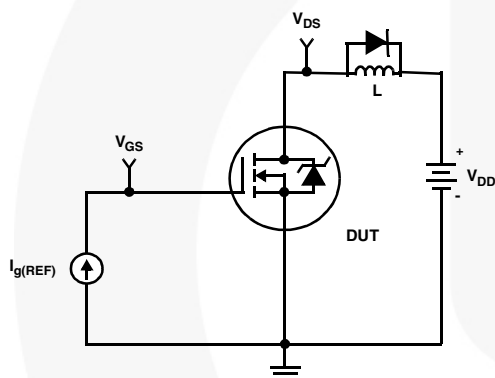


Figure 17. Gate Charge Test Circuit

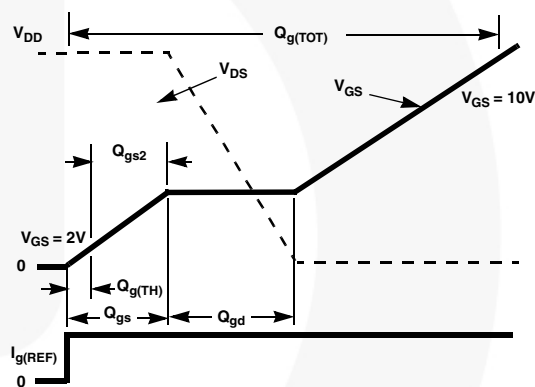


Figure 18. Gate Charge Waveforms

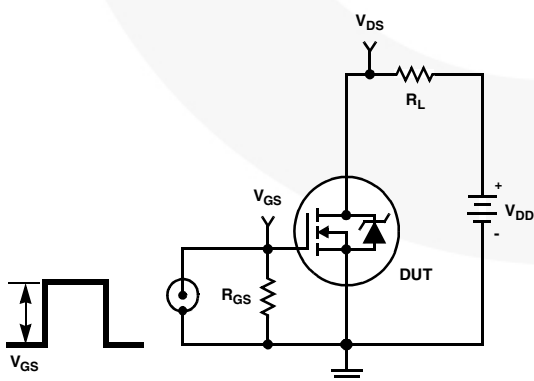


Figure 19. Switching Time Test Circuit

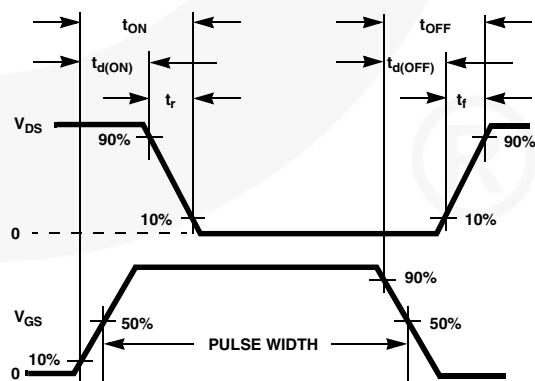


Figure 20. Switching Time Waveforms

SPICE Thermal Model

REV 23 March 2002

FDP047AN08A0T

CTHERM1 th 6 6.45e-3
 CHERM2 6 5 3e-2
 CHERM3 5 4 1.4e-2
 CHERM4 4 3 1.65e-2
 CHERM5 3 2 4.85e-2
 CHERM6 2 tl 1e-1

RHERM1 th 6 3.24e-3
 RHERM2 6 5 8.08e-3
 RHERM3 5 4 2.28e-2
 RHERM4 4 3 1e-1
 RHERM5 3 2 1.1e-1
 RHERM6 2 tl 1.4e-1

SABER Thermal Model

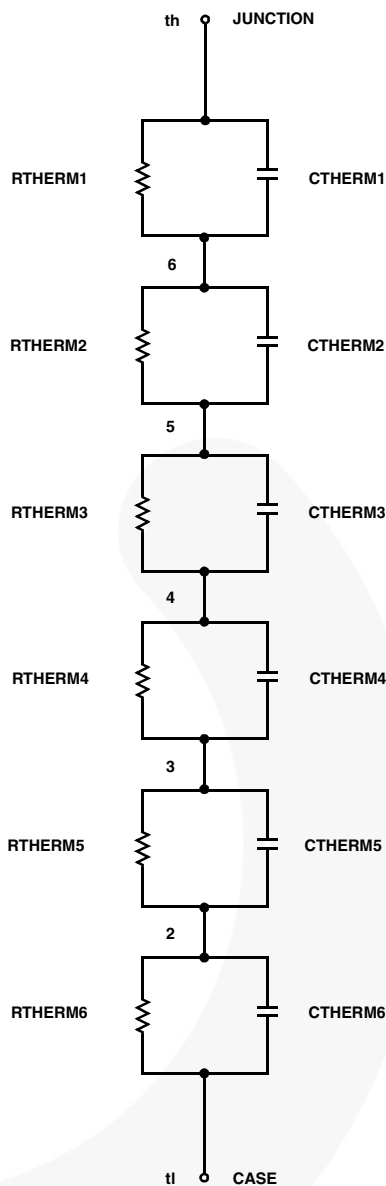
SABER thermal model FDP047AN08A0T

template thermal_model th tl

thermal_c th, tl

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  ctherm.ctherm2 6 5 = 3e-2
  ctherm.ctherm3 5 4 = 1.4e-2
  ctherm.ctherm4 4 3 = 1.65e-2
  ctherm.ctherm5 3 2 = 4.85e-2
  ctherm.ctherm6 2 tl = 1e-1
```

```
rtherm.rtherm1 th 6 = 3.24e-3
rtherm.rtherm2 6 5 = 8.08e-3
rtherm.rtherm3 5 4 = 2.28e-2
rtherm.rtherm4 4 3 = 1e-1
rtherm.rtherm5 3 2 = 1.1e-1
rtherm.rtherm6 2 tl = 1.4e-1
}
```



Mechanical Dimensions

TO-220 3L

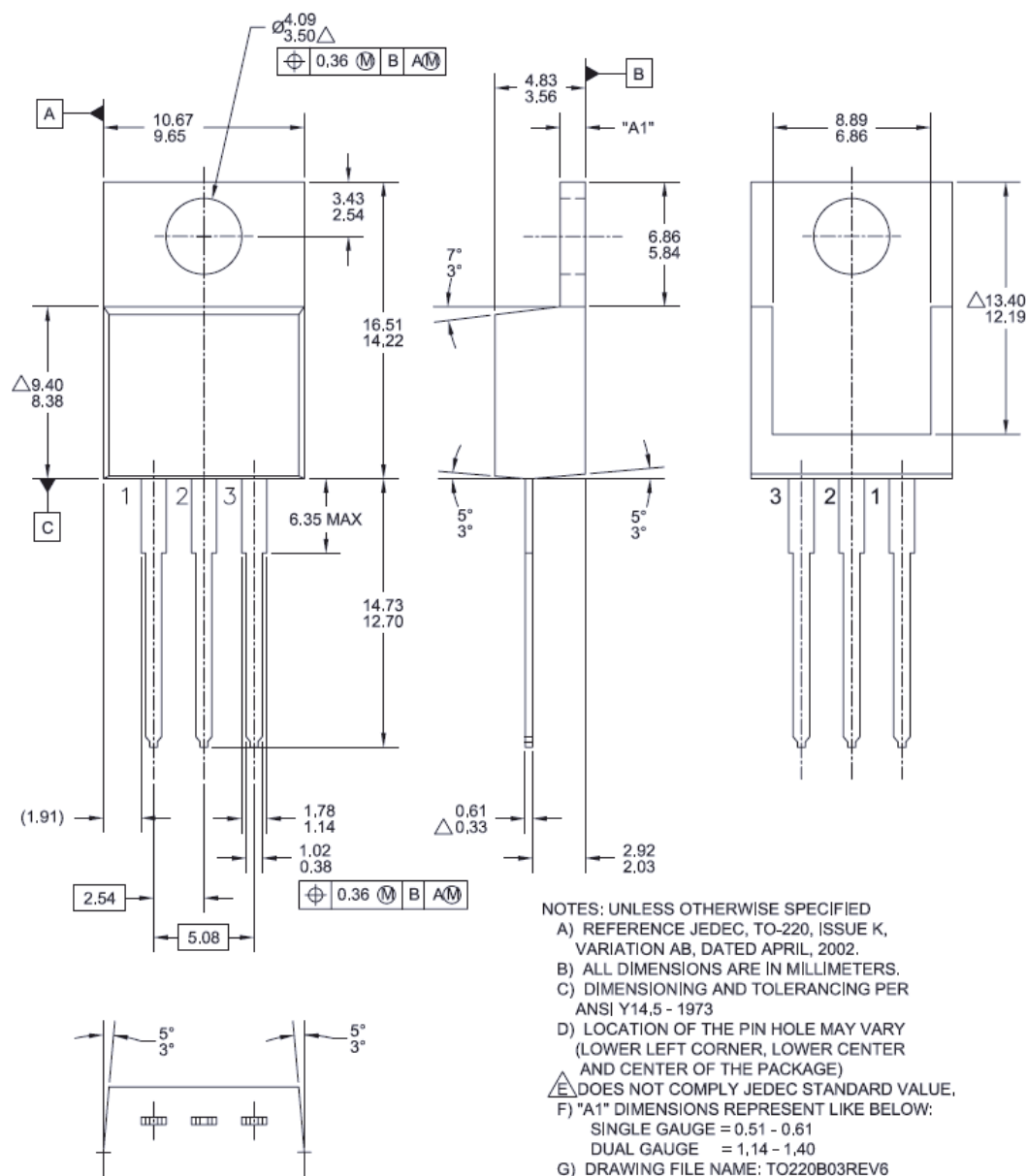


Figure 21. TO-220, Molded, 3Lead, Jedec Variation AB

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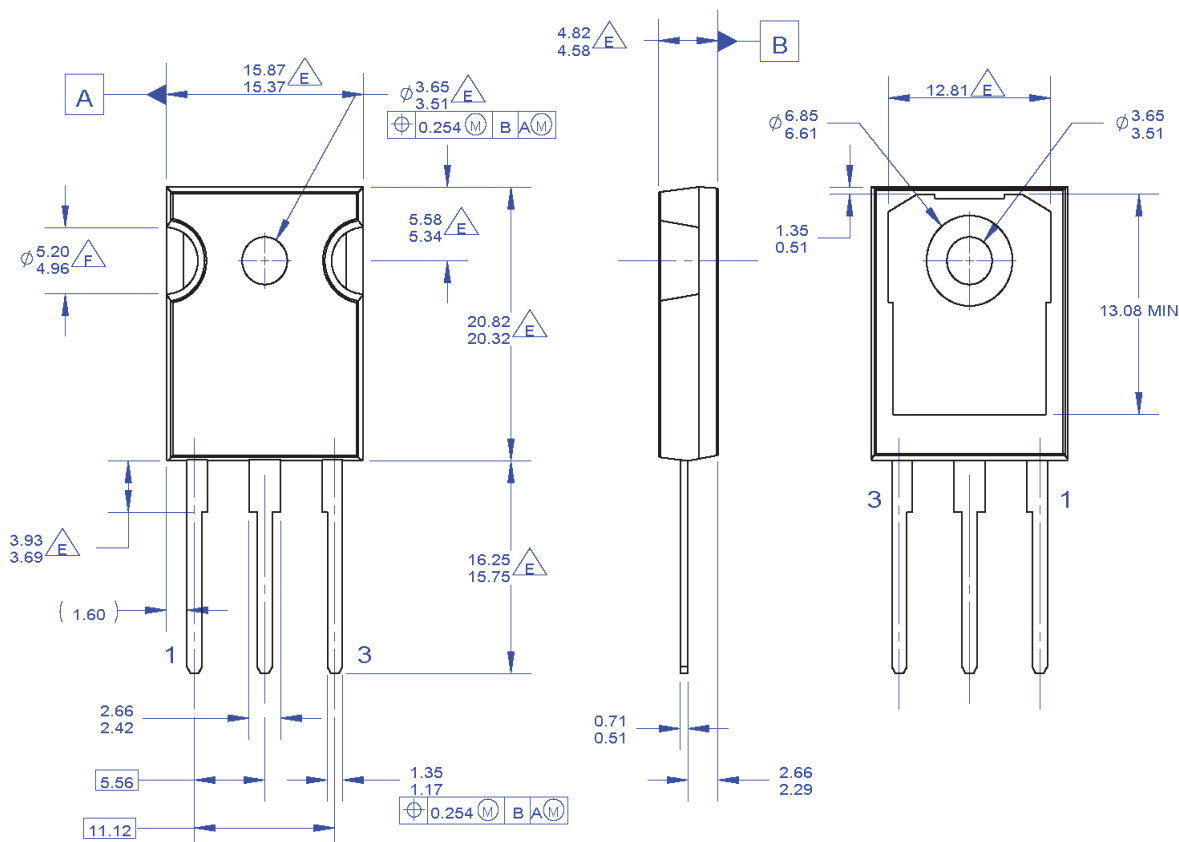
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Dimension in Millimeters

Mechanical Dimensions

TO-247 3L



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. PACKAGE REFERENCE: JEDEC TO-247, ISSUE E, VARIATION AB, DATED JUNE, 2004.
- B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DRAWING CONFORMS TO ASME Y14.5 - 1994

$\triangle E$ DOES NOT COMPLY JEDEC STANDARD VALUE

$\triangle F$ NOTCH MAY BE SQUARE

G. DRAWING FILENAME: MKT-TO247A03_REV03

Figure 22. TO-247, Molded, 3 Lead, Jedec Variation AB

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Dimension in Millimeters



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No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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