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FDP42AN15A0

N-Channel PowerTrench® MOSFET

150 V, 35 A, 42 mΩ

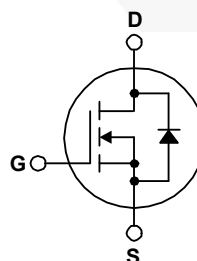
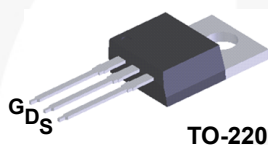
Features

- $R_{DS(on)} = 36 \text{ m}\Omega$ (Typ.) @ $V_{GS} = 10 \text{ V}$, $I_D = 12 \text{ A}$
- $Q_{G(tot)} = 33 \text{ nC}$ (Typ.) @ $V_{GS} = 10 \text{ V}$
- Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)

Applications

- Consumer Appliances
- Synchronous Rectification
- Uninterruptible Power Supply
- Micro Solar Inverter

Formerly developmental type 82864



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

Symbol	Parameter	FDP42AN15A0	Unit
V_{DSS}	Drain to Source Voltage	150	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current		
	Continuous ($T_C = 25^\circ\text{C}$, $V_{GS} = 10\text{V}$)	35	A
	Continuous ($T_C = 100^\circ\text{C}$, $V_{GS} = 10\text{V}$)	24	
	Continuous ($T_{amb} = 25^\circ\text{C}$, $V_{GS} = 10\text{V}$, with $R_{\theta JA} = 43^\circ\text{C/W}$)	5	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 1)	90	mJ
P_D	Power dissipation	150	W
	Derate above 25°C	1.00	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.	1.0	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP42AN15A0	FDP42AN15A0	TO-220	Tube	N/A	50 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

$B_{V_{DS}}$	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	150	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 120\text{V}$ $V_{GS} = 0\text{V}$ $T_C = 150^\circ\text{C}$	-	-	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	$I_D = 12\text{A}$, $V_{GS} = 10\text{V}$	-	0.036	0.042	Ω
		$I_D = 6\text{A}$, $V_{GS} = 6\text{V}$	-	0.040	0.060	
		$I_D = 12\text{A}$, $V_{GS} = 10\text{V}$, $T_J = 175^\circ\text{C}$	-	0.090	0.107	

Dynamic Characteristics

C_{ISS}	Input Capacitance	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$	-	2150	-	pF
C_{OSS}	Output Capacitance		-	225	-	pF
C_{RSS}	Reverse Transfer Capacitance		-	45	-	pF
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0\text{V}$ to 10V	-	30	39	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0\text{V}$ to 2V	-	4.2	5.4	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DD} = 75\text{V}$ $I_D = 12\text{A}$ $I_g = 1.0\text{mA}$	-	9.5	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	5.3	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	6.9	-	nC

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

t_{ON}	Turn-On Time	$V_{DD} = 75\text{V}$, $I_D = 12\text{A}$ $V_{GS} = 10\text{V}$, $R_{GS} = 7.5\Omega$	-	-	46	ns
$t_{d(ON)}$	Turn-On Delay Time		-	11	-	ns
t_r	Rise Time		-	19	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	27	-	ns
t_f	Fall Time		-	23	-	ns
t_{OFF}	Turn-Off Time		-	-	74	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 12\text{A}$	-	-	1.25	V
		$I_{SD} = 6\text{A}$	-	-	1.0	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 12\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	82	ns
Q_{RR}	Reverse Recovered Charge	$I_{SD} = 12\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	204	nC

Notes:

1: Starting $T_J = 25^\circ\text{C}$, $L = 0.2\text{mH}$, $I_{AS} = 30\text{A}$.

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

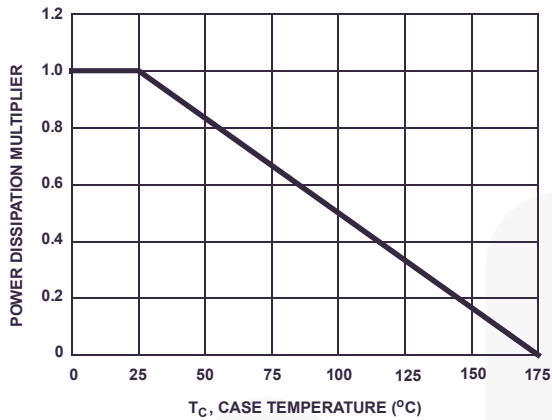


Figure 1. Normalized Power Dissipation vs Ambient Temperature

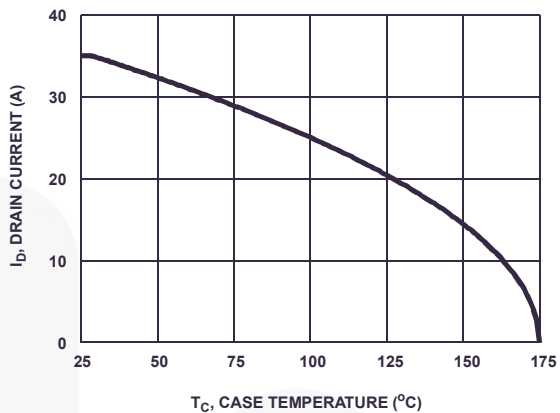


Figure 2. Maximum Continuous Drain Current vs Case Temperature

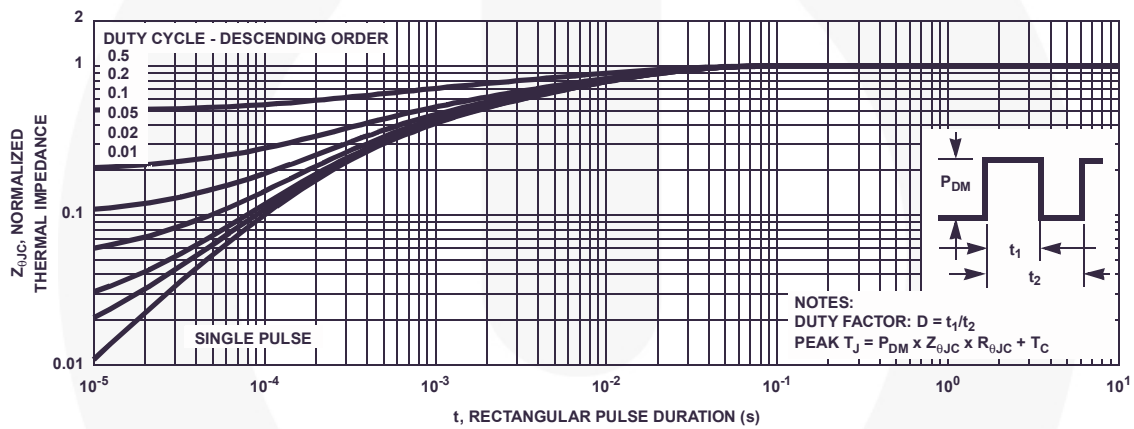


Figure 3. Normalized Maximum Transient Thermal Impedance

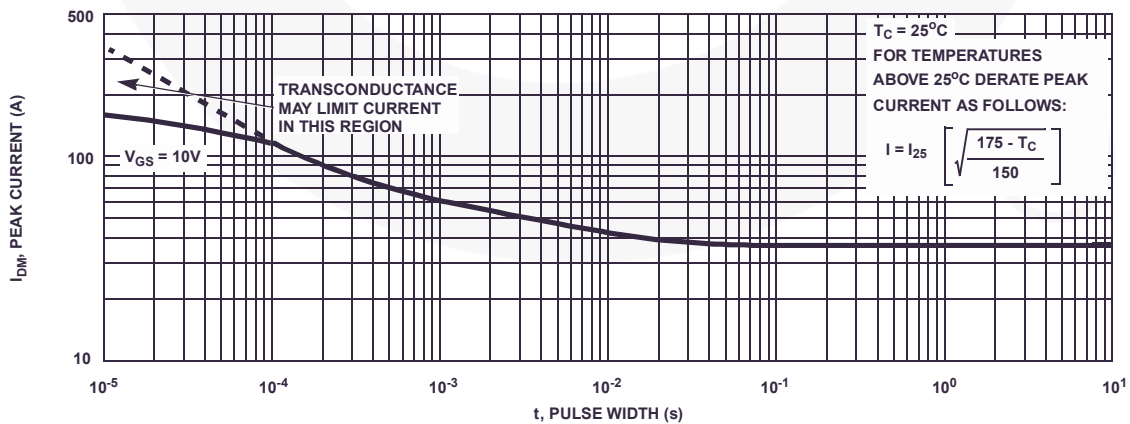


Figure 4. Peak Current Capability

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

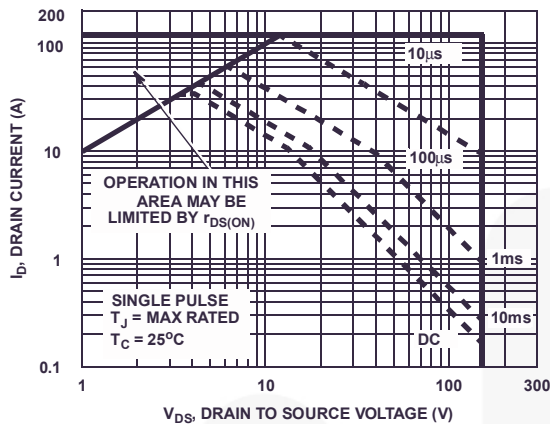
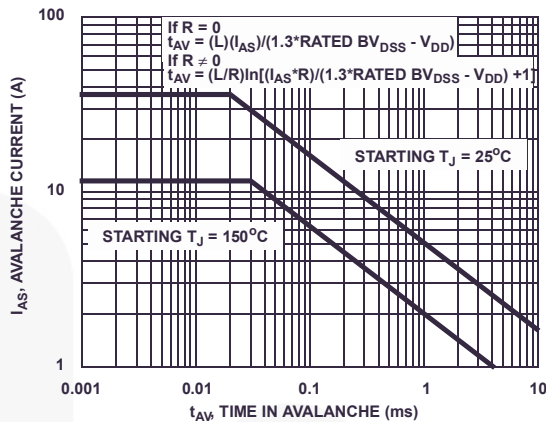


Figure 5. Forward Bias Safe Operating Area



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

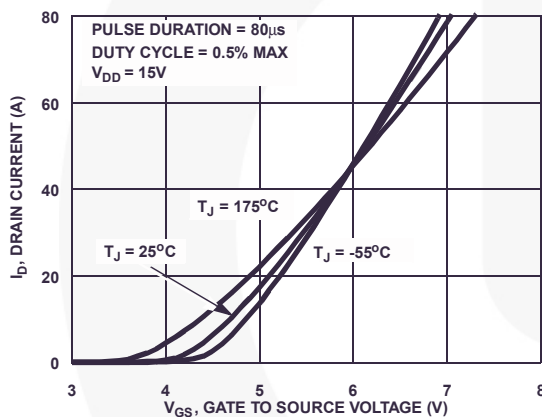


Figure 7. Transfer Characteristics

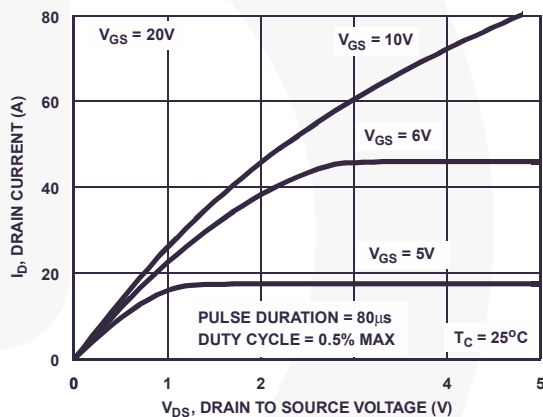


Figure 8. Saturation Characteristics

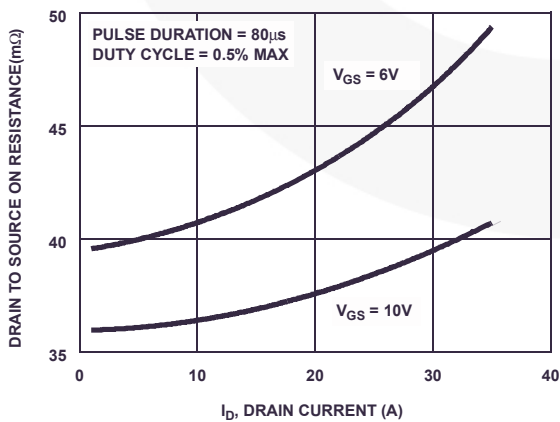


Figure 9. Drain to Source On Resistance vs Drain Current

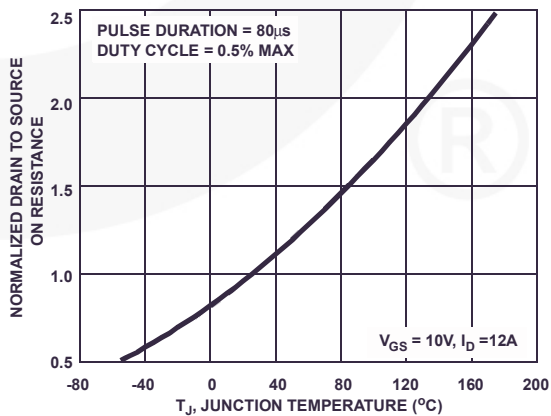


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

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

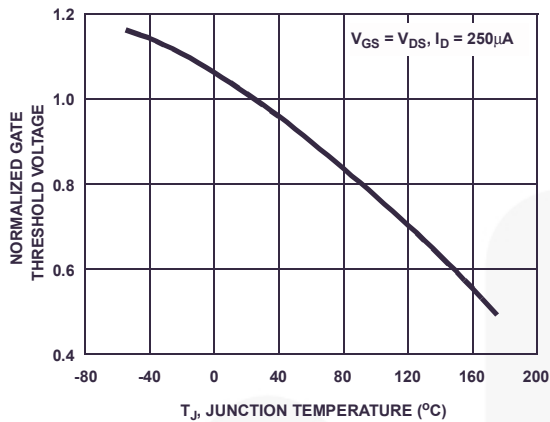


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

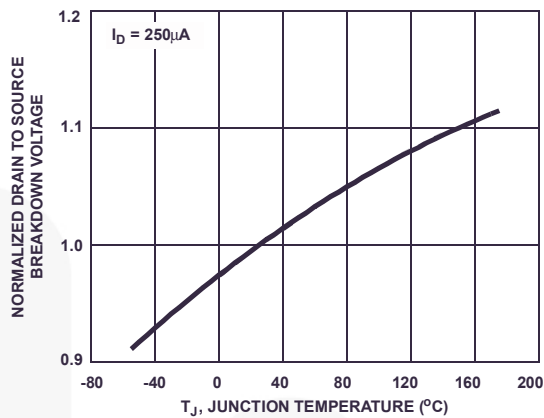


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

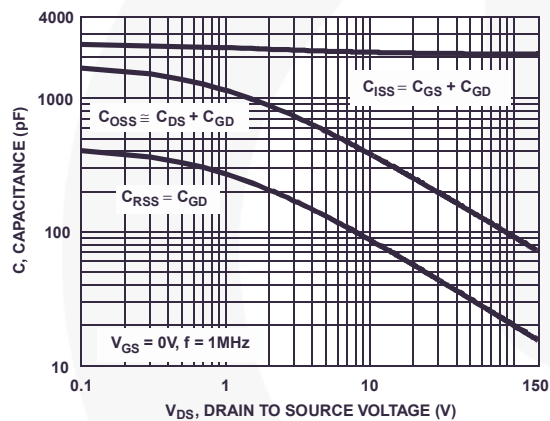


Figure 13. Capacitance vs Drain to Source Voltage

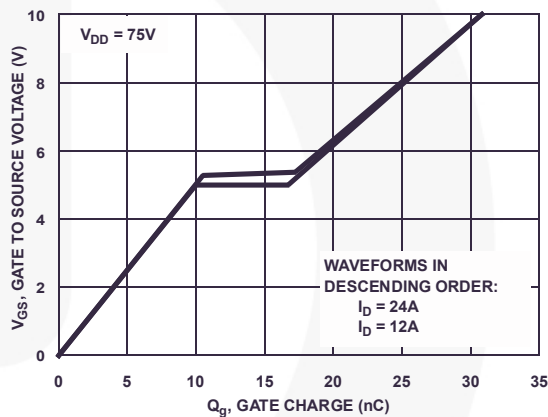


Figure 14. Gate Charge Waveforms for Constant Gate Current

Test Circuits and Waveforms

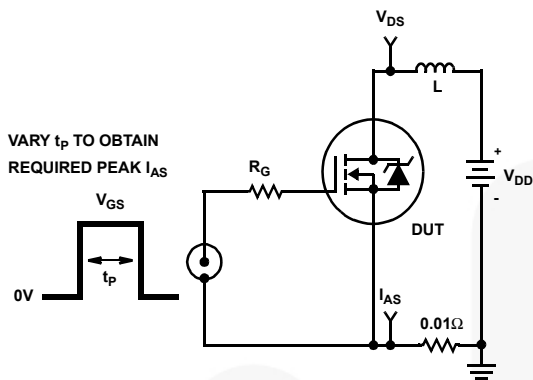


Figure 15. Unclamped Energy Test Circuit

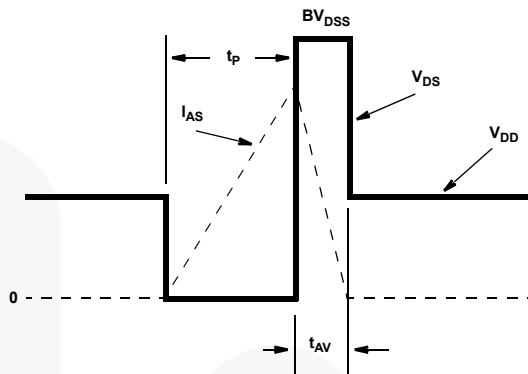


Figure 16. Unclamped Energy Waveforms

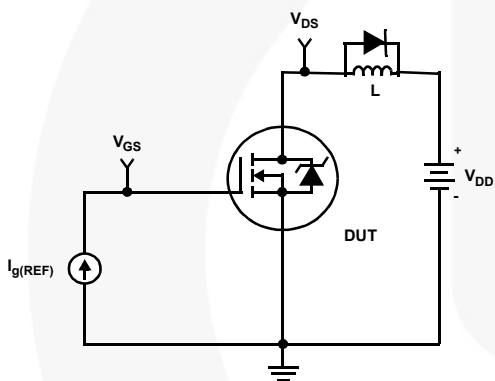


Figure 17. Gate Charge Test Circuit

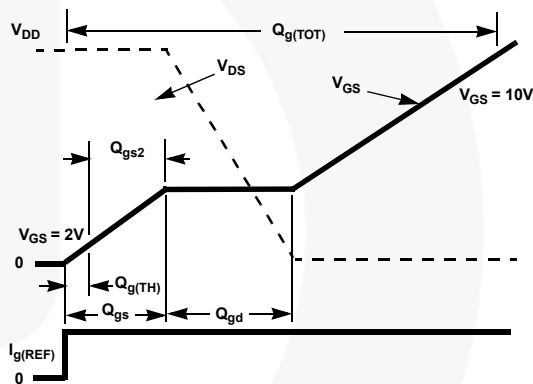


Figure 18. Gate Charge Waveforms

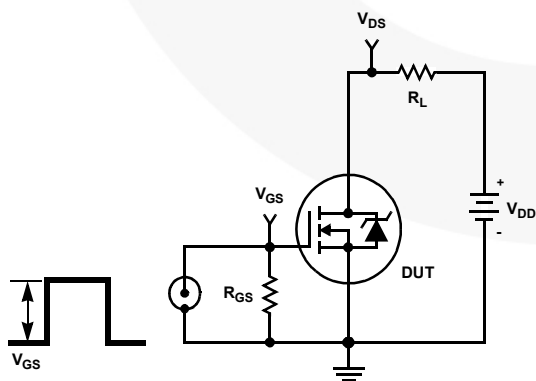


Figure 19. Switching Time Test Circuit

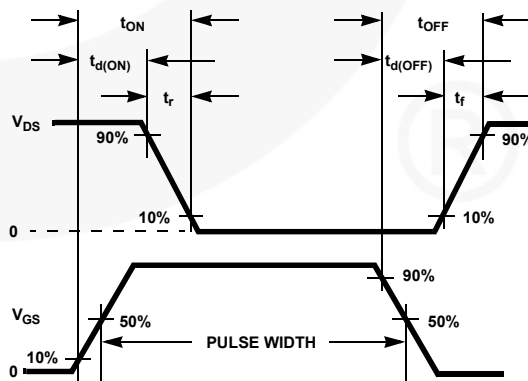


Figure 20. Switching Time Waveforms

SPICE Thermal Model

REV 23 June 11, 2002

FDB42AN15A0_Thermal

```

CTHERM1 TH 6 2e-3
CTHERM2 6 5 4.5e-3
CTHERM3 5 4 7e-3
CTHERM4 4 3 3e-2
CTHERM5 3 2 4e-2
CTHERM6 2 TL 8.5e-1
    
```

```

R THERM1 TH 6 6.2e-2
R THERM2 6 5 8.2e-2
R THERM3 5 4 9.2e-2
R THERM4 4 3 9.7e-2
R THERM5 3 2 0.2
R THERM6 2 TL 0.22
    
```

SABER Thermal Model

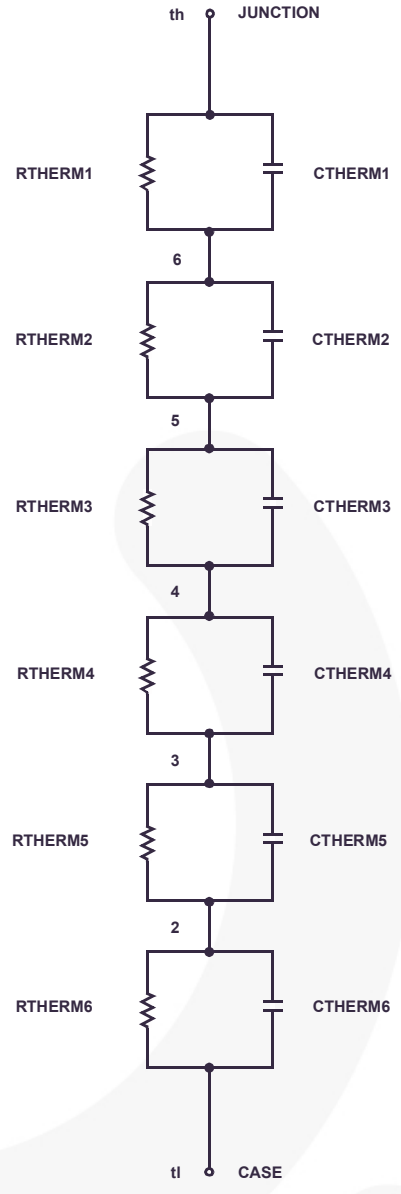
SABER thermal model FDB42AN15A0_Thermal
 template thermal_model th tl
 thermal_c th, tl

```

{
ctherm.ctherm1 th 6 =2e-3
ctherm.ctherm2 6 5 =4.5e-3
ctherm.ctherm3 5 4 =7e-3
ctherm.ctherm4 4 3 =3e-2
ctherm.ctherm5 3 2 =4e-2
ctherm.ctherm6 2 tl =8.5e-1
    
```

```

rtherm.rtherm1 th 6 =6.2e-2
rtherm.rtherm2 6 5 =8.2e-2
rtherm.rtherm3 5 4 =9.2e-2
rtherm.rtherm4 4 3 =9.7e-2
rtherm.rtherm5 3 2 =0.2
rtherm.rtherm6 2 tl =0.22}
    
```



Mechanical Dimensions

TO-220 3L

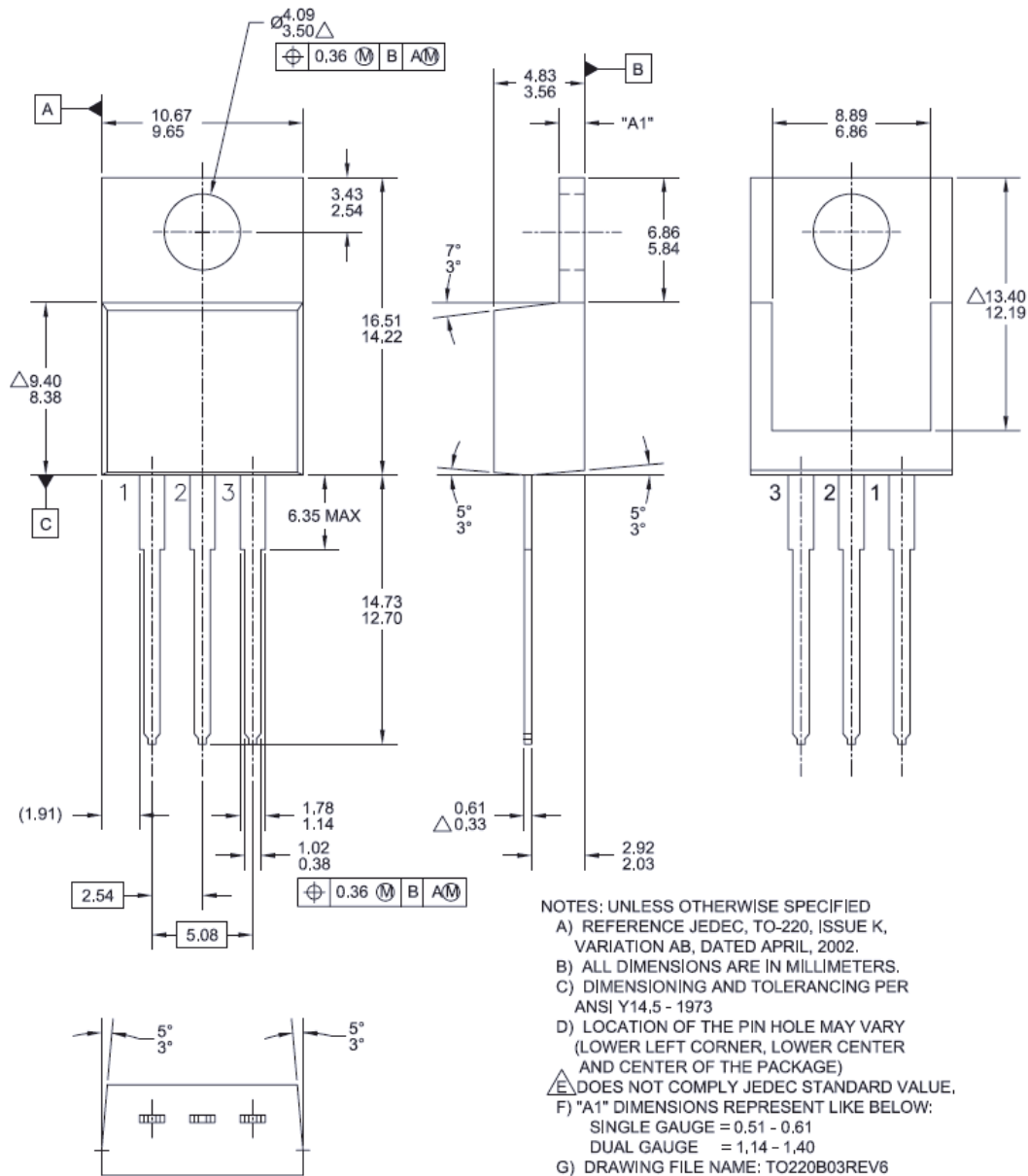


Figure 21. TO-220, Molded, 3Lead, Jedec Variation AB

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Dimension in Millimeters



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