

# FGPF45N45T

## 450V, 45A PDP Trench IGBT

### Features

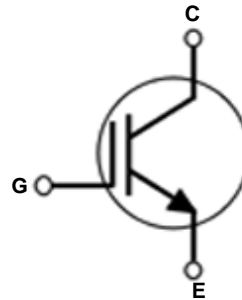
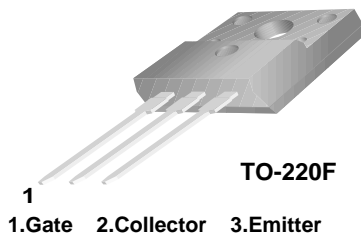
- High Current Capability
- Low saturation voltage:  $V_{CE(sat)} = 1.6V @ I_C = 45A$
- High input impedance
- Fast switching

### General Description

Using Novel Trench IGBT Technology, Fairchild's new series of trench IGBTs offer the optimum performance for PDP applications where low conduction and switching losses are essential.

### Applications

- PDP System



### Absolute Maximum Ratings

Symbol	Description	Ratings	Units
$V_{CES}$	Collector to Emitter Voltage	450	V
$V_{GES}$	Gate to Emitter Voltage	$\pm 30$	V
$I_{CM} (1)$	Pulsed Collector Current @ $T_C = 25^\circ C$	180	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ C$	51.6	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	20.6	W
$T_J$	Operating Junction Temperature	-55 to +150	$^\circ C$
$T_{stg}$	Storage Temperature Range	-55 to +150	$^\circ C$
$T_L$	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ C$

**Notes:**


1: Repetitive test, Pulse width=100usec, Duty=0.1

\*  $I_{C\_pulse}$  limited by max  $T_J$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	-	2.42	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	62.5	$^\circ C/W$

## Package Marking and Ordering Information

Device Marking	Device	Package	 Eco Status	Packaging Type	Qty per Tube
FGPF45N45T	FGFP45N45TTU	TO-220F	RoHS	Rail / Tube	50ea



For Fairchild's definition of "green" Eco Status, please visit: [http://www.fairchildsemi.com/company/green/rohs\\_green.html](http://www.fairchildsemi.com/company/green/rohs_green.html).

## Electrical Characteristics of the IGBT T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV <sub>CES</sub>	Collector to Emitter Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 250μA	450	-	-	V
ΔBV <sub>CES</sub> ΔT <sub>J</sub>	Temperature Coefficient of Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 250μA	-	0.5	-	V/°C
I <sub>CES</sub>	Collector Cut-Off Current	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0V	-	-	100	μA
I <sub>GES</sub>	G-E Leakage Current	V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V	-	-	±400	nA
On Characteristics						
V <sub>GE(th)</sub>	G-E Threshold Voltage	I <sub>C</sub> = 250μA, V <sub>CE</sub> = V <sub>GE</sub>	3.0	4.3	5.5	V
V <sub>CE(sat)</sub>	Collector to Emitter Saturation Voltage	I <sub>C</sub> = 20A, V <sub>GE</sub> = 15V	-	1.21	1.5	V
		I <sub>C</sub> = 45A, V <sub>GE</sub> = 15V	-	1.60	-	V
		I <sub>C</sub> = 45A, V <sub>GE</sub> = 15V, T <sub>C</sub> = 125°C	-	1.57	-	V
Dynamic Characteristics						
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 30V, V <sub>GE</sub> = 0V, f = 1MHz	-	2140	-	pF
C <sub>oes</sub>	Output Capacitance		-	130	-	pF
C <sub>res</sub>	Reverse Transfer Capacitance		-	102	-	pF
Switching Characteristics						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 200V, I <sub>C</sub> = 45A, R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15V, Resistive Load, T <sub>C</sub> = 25°C	-	26	-	ns
t <sub>r</sub>	Rise Time		-	100	-	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		-	170	-	ns
t <sub>f</sub>	Fall Time		-	220	330	ns
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 200V, I <sub>C</sub> = 45A, R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15V, Resistive Load, T <sub>C</sub> = 125°C	-	22	-	ns
t <sub>r</sub>	Rise Time		-	90	-	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		-	132	-	ns
t <sub>f</sub>	Fall Time		-	280	-	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>CE</sub> = 200V, I <sub>C</sub> = 45A, V <sub>GE</sub> = 15V	-	100	-	nC
Q <sub>ge</sub>	Gate to Emitter Charge		-	15	-	nC
Q <sub>gc</sub>	Gate to Collector Charge		-	46	-	nC

## Typical Performance Characteristics

Figure 1. Typical Output Characteristics

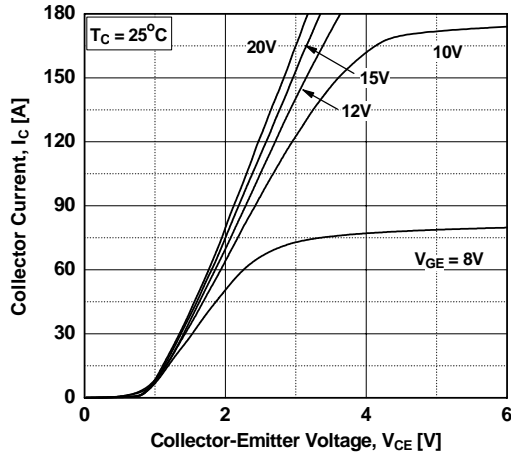


Figure 2. Typical Output Characteristics

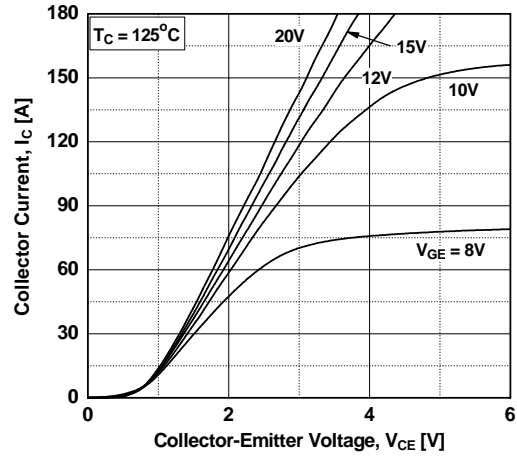


Figure 3. Typical Saturation Voltage Characteristics

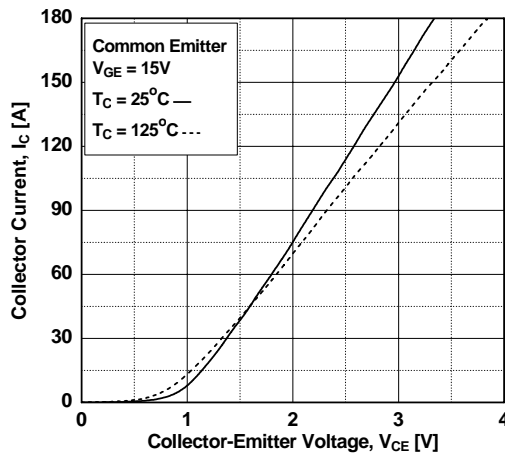


Figure 4. Transfer Characteristics

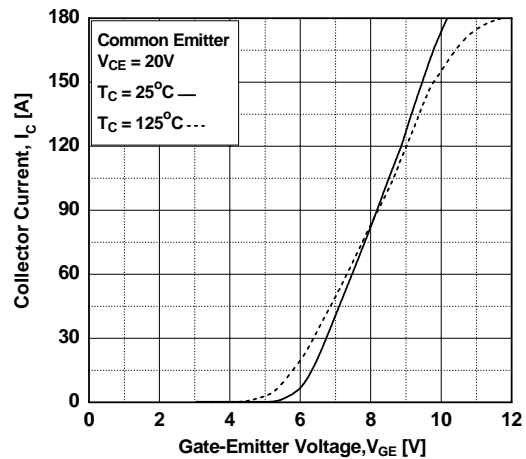


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

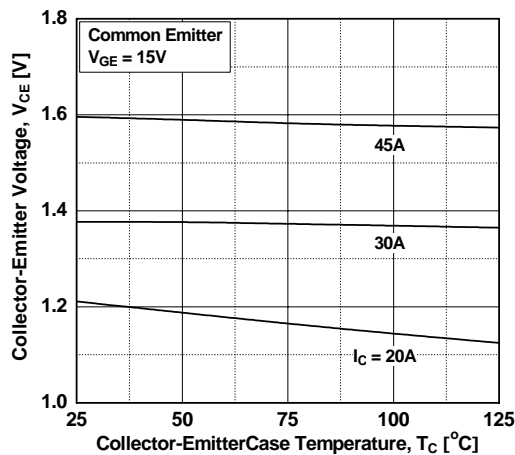
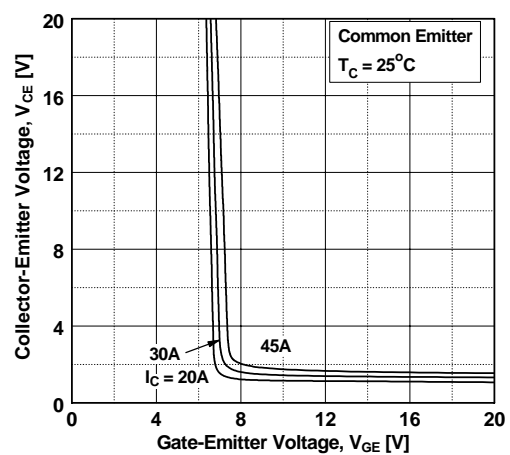


Figure 6. Saturation Voltage vs. Vge



## Typical Performance Characteristics

Figure 7. Saturation Voltage vs.  $V_{GE}$

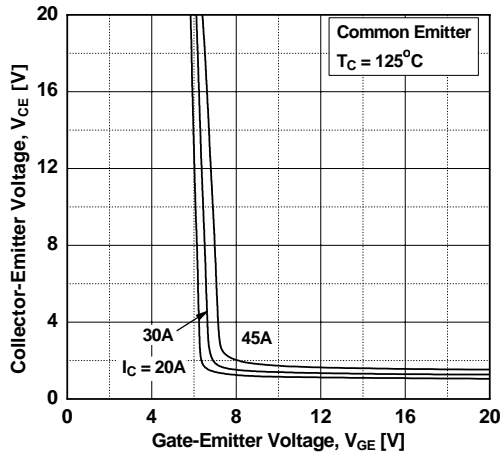


Figure 8. Capacitance Characteristics

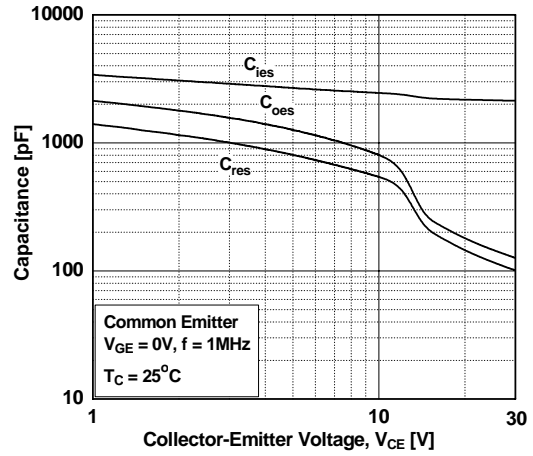


Figure 9. Gate charge Characteristics

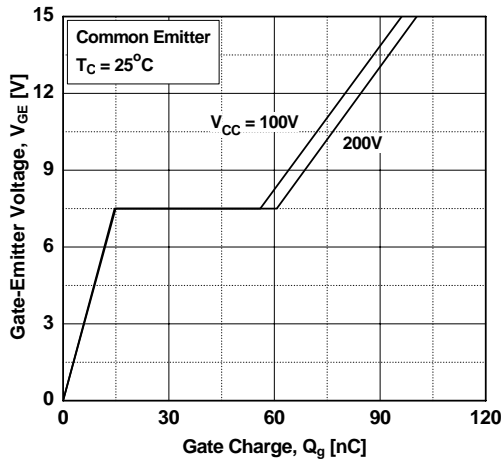


Figure 10. SOA Characteristics

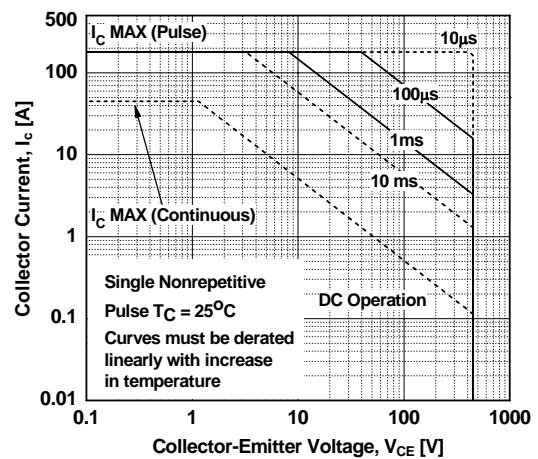


Figure 11. Turn-on Characteristics vs. Gate Resistance

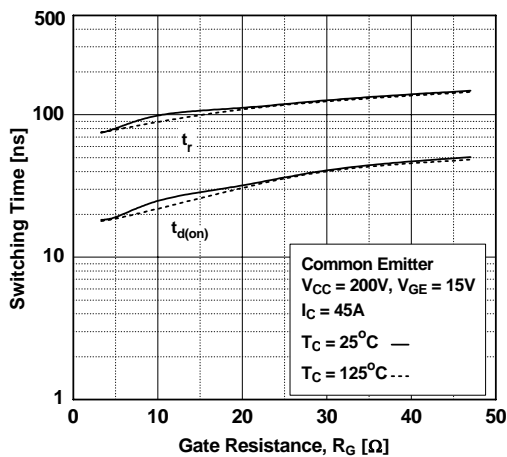
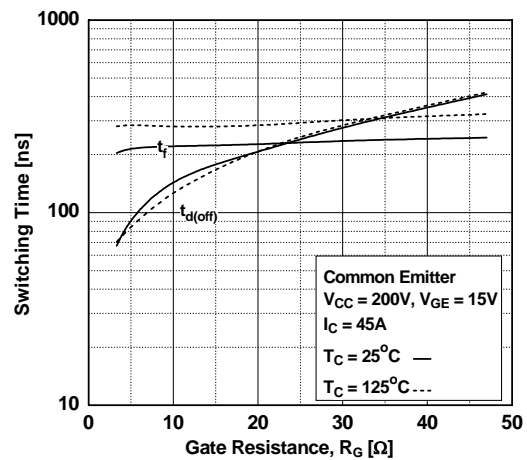


Figure 12. Turn-off Characteristics vs. Gate Resistance



## Typical Performance Characteristics

Figure 13. Turn-on Characteristics vs. Collector Current

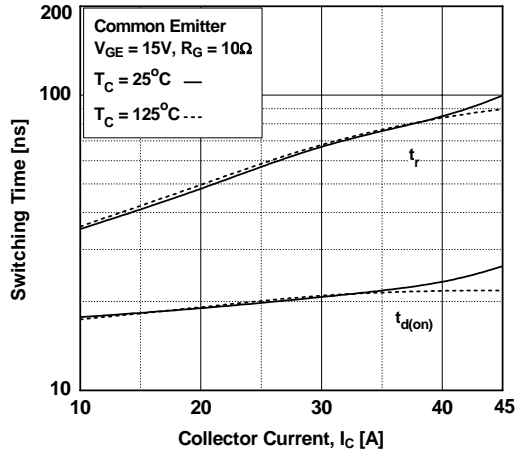


Figure 14. Turn-off Characteristics vs. Collector Current

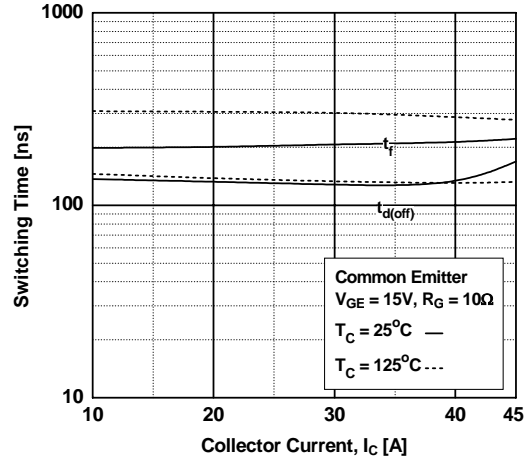


Figure 15. Switching Loss vs. Gate Resistance

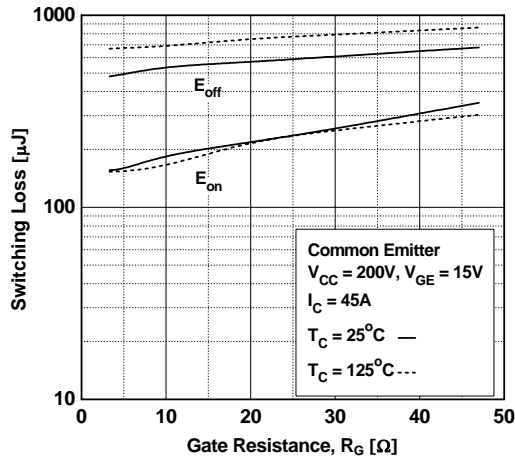


Figure 16. Switching Loss vs. Gate Resistance

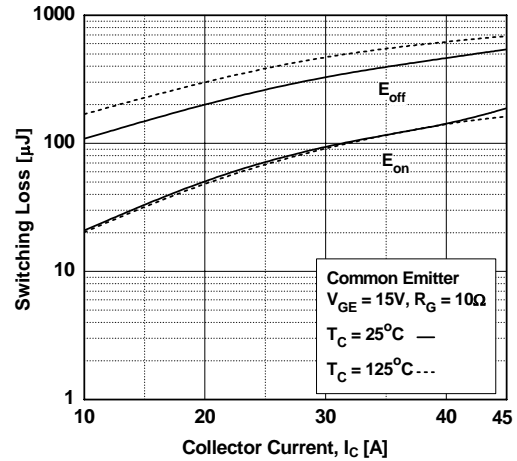
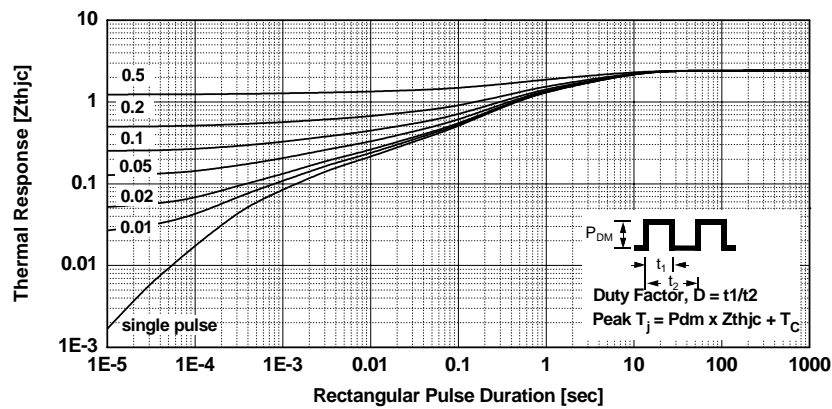
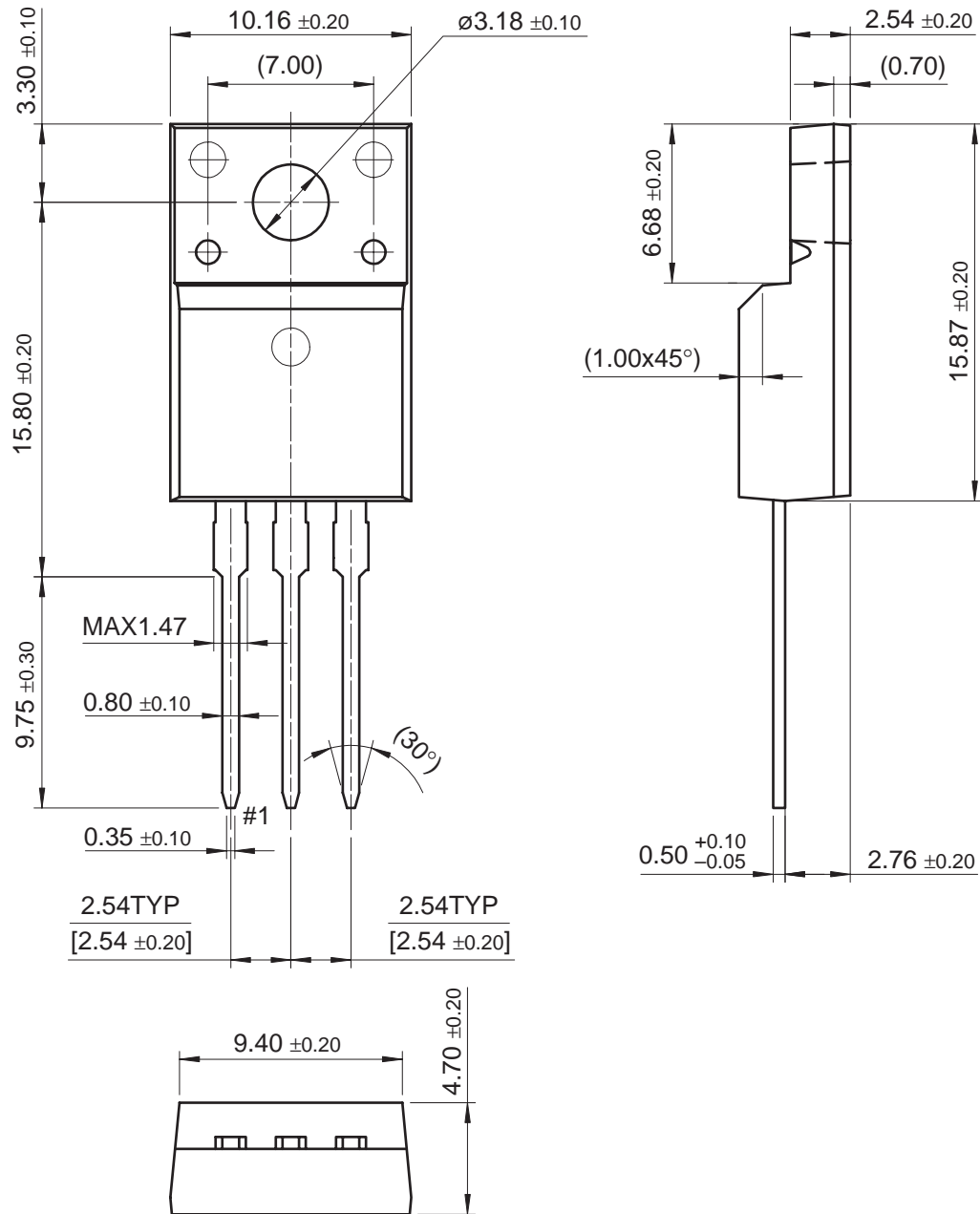


Figure 17. Transient Thermal Impedance of IGBT



# Mechanical Dimensions

## TO-220F






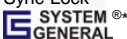


Dimensions in Millimeters



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