TIP47G, TIP48G, TIP50G

High Voltage NPN Silicon Power Transistors

This series is designed for line operated audio output amplifier, SWITCHMODE power supply drivers and other switching applications.

Features

- Popular TO-220 Plastic Package
- Complementary to the MJE5730 and MJE5731 Series
- These Devices are Pb-Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	TIP47	TIP48	TIP50	Unit		
Collector - Emitter Voltage	V _{CEO}	250 300 400		Vdc			
Collector - Base Voltage	V _{CB}	350 400 500			Vdc		
Emitter – Base Voltage	V _{EB}	5.0 Vo		Vdc			
Collector Current – Continuous	۱ _C	1.0 Ade			1.0		Adc
Collector Current – Peak	I _{CM}	2.0 Ac		2.0 A		Adc	
Base Current	Ι _Β	0.6 Adc			0.6		Adc
Total Power Dissipation @ T _C = 25°C Derate above 25°C	P _D			W W/°C			
Total Power Dissipation @ T _C = 25°C Derate above 25°C	P _D	2.0 W 0.016 W/°C					
Unclamped Inducting Load Energy (See Figure 8)	E	20 mJ		mJ			
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-(65 to +15	50	°C		

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

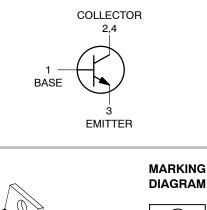
Characteristic	Symbol	Мах	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.125	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	°C/W

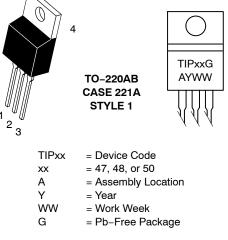


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1.0 AMPERE POWER TRANSISTORS NPN SILICON 250-300-400 VOLTS 40 WATTS





ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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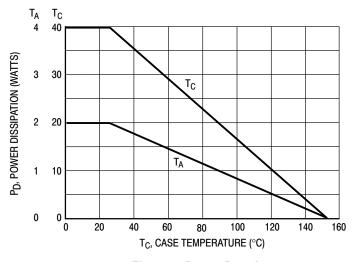
ELECTRICAL CHARACTERISTICS ($T_C = 25^{\circ}C$ unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage (Note 1) ($I_C = 30 \text{ mAdc}, I_B = 0$)	TIP47 TIP48 TIP50	V _{CEO(sus)}	250 300 400	- - -	Vdc
Collector Cutoff Current $(V_{CE} = 150 \text{ Vdc}, I_B = 0)$ $(V_{CE} = 200 \text{ Vdc}, I_B = 0)$ $(V_{CE} = 300 \text{ Vdc}, I_B = 0)$	TIP47 TIP48 TIP50	I _{CEO}		1.0 1.0 1.0	mAdc
$ Collector Cutoff Current \\ (V_{CE} = 350 Vdc, V_{BE} = 0) \\ (V_{CE} = 400 Vdc, V_{BE} = 0) \\ (V_{CE} = 500 Vdc, V_{BE} = 0) $	TIP47 TIP48 TIP50	I _{CES}		1.0 1.0 1.0	mAdc
Emitter Cutoff Current ($V_{BE} = 5.0 \text{ Vdc}, I_C = 0$)		I _{EBO}	-	1.0	mAdc
ON CHARACTERISTICS (Note 1)					
DC Current Gain ($I_C = 0.3 \text{ Adc}, V_{CE} = 10 \text{ Vdc}$) ($I_C = 1.0 \text{ Adc}, V_{CE} = 10 \text{ Vdc}$)		h _{FE}	30 10	150 -	-
Collector–Emitter Saturation Voltage $(I_C = 1.0 \text{ Adc}, I_B = 0.2 \text{ Adc})$		V _{CE(sat)}	-	1.0	Vdc
Base-Emitter On Voltage (I _C = 1.0 Adc, V _{CE} = 10 Vdc)		V _{BE(on)}	-	1.5	Vdc
DYNAMIC CHARACTERISTICS					-
Current–Gain – Bandwidth Product ($I_C = 0.1 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 2.0 \text{ MHz}$)		f _T	10	-	MHz
Small–Signal Current Gain (I _C = 0.2 Adc, V _{CE} = 10 Vdc, f = 1.0 kHz)		h _{fe}	25	-	-

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions. 1. Pulse Test: Pulse width \leq 300 µs, Duty Cycle \leq 2.0%.

ORDERING INFORMATION

Device	Package	Shipping
TIP47G	TO-220 (Pb-Free)	50 Units / Rail
TIP48G	TO-220 (Pb-Free)	50 Units / Rail
TIP49G	TO-220 (Pb-Free)	50 Units / Rail
TIP50G	TO-220 (Pb-Free)	50 Units / Rail





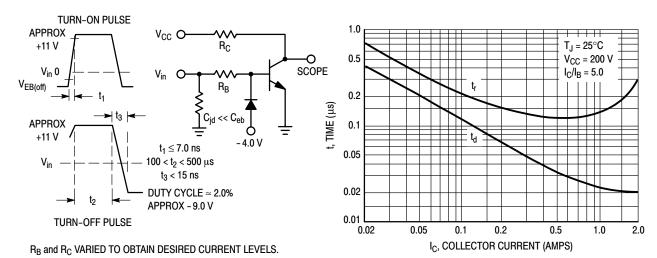


Figure 2. Switching Time Equivalent Circuit

Figure 3. Turn-On Time

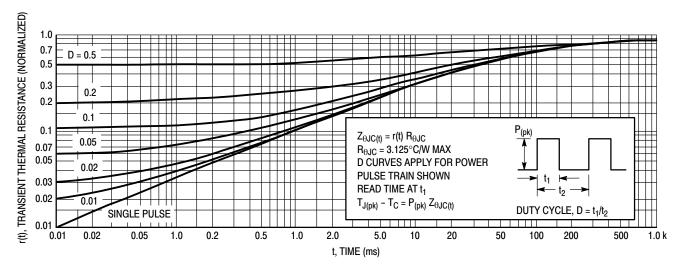


Figure 4. Thermal Response

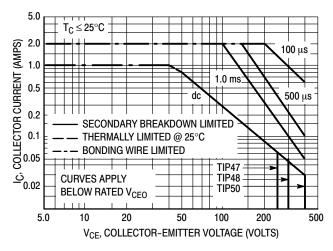
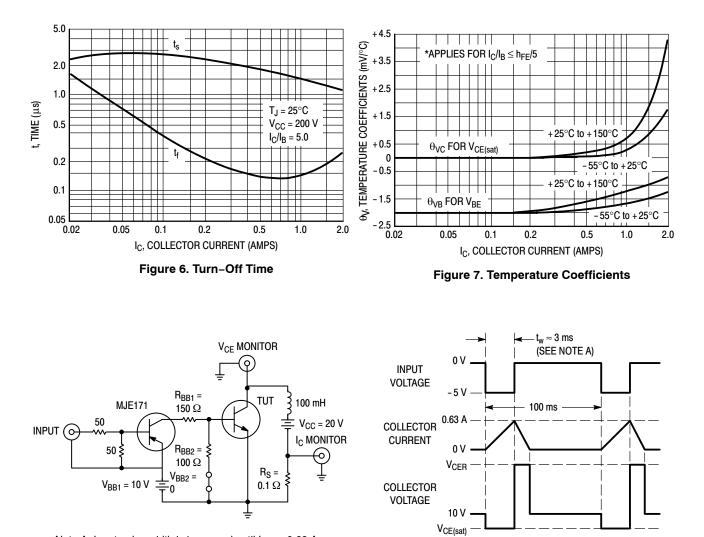


Figure 5. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation, i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

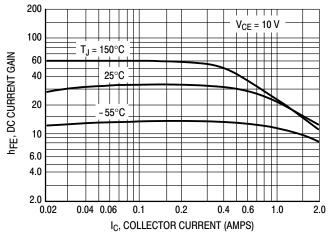
The data of Figure 5 is based on $T_{J(pk)} = 150^{\circ}$ C; T_{C} is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \le 150^{\circ}$ C. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.



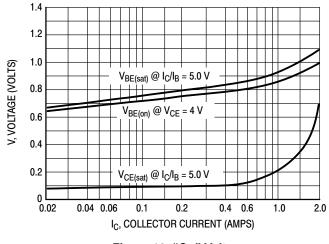
Note A: Input pulse width is increased until I_{CM} = 0.63 A.



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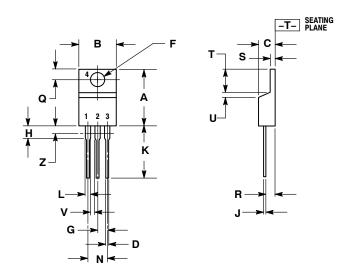






PACKAGE DIMENSIONS

TO-220 CASE 221A-09 **ISSUE AH**



NOTES DIMENSIONING AND TOLERANCING PER ANSI

Y14.5M, 1982. CONTROLLING DIMENSION: INCH.

DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE 3 ALLOWED.

	INCHES		MILLIN	IETERS	
DIM	MIN	MAX	MIN	MAX	
Α	0.570	0.620	14.48	15.75	
В	0.380	0.415	9.66	10.53	
С	0.160	0.190	4.07	4.83	
D	0.025	0.038	0.64	0.96	
F	0.142	0.161	3.61	4.09	
G	0.095	0.105	2.42	2.66	
Н	0.110	0.161	2.80	4.10	
ſ	0.014	0.024	0.36	0.61	
Κ	0.500	0.562	12.70	14.27	
L	0.045	0.060	1.15	1.52	
Ν	0.190	0.210	4.83	5.33	
Q	0.100	0.120	2.54	3.04	
R	0.080	0.110	2.04	2.79	
S	0.045	0.055	1.15	1.39	
Т	0.235	0.255	5.97	6.47	
U	0.000	0.050	0.00	1.27	
٧	0.045		1.15		
Ζ		0.080		2.04	

STYLE 1: PIN 1

BASE

2 3. EMITTER 4.

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