TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

Complementary Silicon Plastic Power Transistors

Designed for use in general purpose amplifier and switching applications.

Features

- Epoxy Meets UL 94 V−0 @ 0.125 in
- These Devices are Pb−Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage TIP41G, TIP42G TIP41AG, TIP42AG TIP41BG, TIP42BG TIP41CG, TIP42CG	V_{CEO}	 40 60 80 100	Vdc
Collector−Base Voltage TIP41G, TIP42G TIP41AG, TIP42AG TIP41BG, TIP42BG TIP41CG, TIP42CG	V_{CB}	 40 60 80 100	Vdc
Emitter−Base Voltage	V_{EB}	5.0	Vdc
Collector Current − Continuous	I_C	6.0	Adc
Collector Current − Peak	I_{CM}	10	Adc
Base Current	I_B	2.0	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	 65 0.52	W W/°C
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	 2.0 0.016	W W/°C
Unclamped Inductive Load Energy (Note 1)	E	62.5	mJ
Operating and Storage Junction, Temperature Range	T_J, T_{stg}	−65 to +150	°C
ESD − Human Body Model	HBM	3B	V
ESD − Machine Model	MM	C	V

Stresses exceeding those listed in the Maximum Ratings table may damage the

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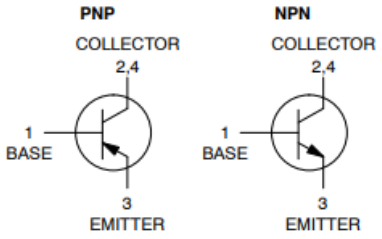
6 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS 40−60−80−100 VOLTS, 65 WATTS



TO−220 CASE 221A STYLE 1

MARKING DIAGRAM

TIP4xx = Device Code

TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	1.67	°C/W
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	57	°C/W

CUI DEVICES

date 02/10/2020
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SERIES: HSE-BX-02 | **DESCRIPTION:** HEAT SINK

FEATURES
- TO-220 package
- placement pins for secure PCB attachment
- round hole for component attachment
- multiple available cut lengths

RoHS

MODEL

	length (mm)	thermal resistance[1] @ 75°C ΔT, nat conv (°C/W)	@ 1 W, nat conv (°C/W)	@ 1 W, 200 LFM (°C/W)	@ 1 W, 400 LFM (°C/W)	power dissipation[1] @ 75°C ΔT, nat conv (W)
HSE-B20254-035H	25.4	12.93	14.40	3.28	2.49	5.80
HSE-B20381-035H	38.1	11.54	13.64	3.66	2.76	6.50
HSE-B20508-035H	50.8	9.62	12.98	5.17	3.28	7.80
HSE-B20508-035H-W[2]	50.8	9.62	12.98	5.17	3.28	7.80
HSE-B20635-035H	63.5	8.15	10.92	4.35	2.86	9.20
HSE-B20635-035H-W[2]	63.5	8.15	10.92	4.35	2.86	9.20

Note:
1. See performance curves for full thermal resistance details.
2. Placement pins with standoffs.
3. Custom cut to length options available. Thermal data not available on custom lengths.

Heatsink Power Dissipation Calculations for the **HSE-B20254-035H**:

HSE-B20254-035H Heat Sink, $Thermal\ Resistance\ = \frac{12.93℃}{1W}$

TIP41, $Thermal\ Resistance = \frac{1.67℃}{1W}$

TIP41, $Maximum\ Temperature = 150℃$

Add Thermal Resistances of the heat sink and the TIP41:

$$Total\ Thermal\ Resistance = \frac{12.93℃}{1W} + \frac{1.67℃}{1W} = \frac{14.6℃}{1W}$$

Design for temperature less than Max TIP Temperature:

$$MaxTemp_{Design} = 90\%(TIPMaxTemp)$$

$$MaxTemp_{Design} = 90\%(150℃)$$

$$MaxTemp_{Design} = 0.9(150℃)$$

$$MaxTemp_{Design} = 135℃$$

Factor in ambient temperature:

$$MaxTempDesign_{W/ambient} = 135℃ - Ambient$$

$$MaxTempDesign_{W/ambient} = 135℃ - 25℃$$

$$MaxTempDesign_{W/ambient} = 110℃$$

Maximum Power Dissipation Calculations:

$$Total\ Thermal\ Resistance = \frac{14.6℃}{1W}$$

$$MaxTempDesign_{W/ambient} = 110℃$$

$$\frac{14.6℃}{1W} = \frac{110℃}{Maximum\ Power\ Dissipation}$$

$$Maximum\ Power\ Dissipation = \frac{1W \times 110℃}{14.6℃}$$

$$Maximum\ Power\ Dissipation = \frac{1W \times 110\cancel{℃}}{14.6\cancel{℃}}$$

$$Maximum\ Power\ Dissipation = \frac{110W}{14.6}$$

$$Maximum\ Power\ Dissipation = 7.534\ watts$$

The HSE-B20254-035H with a TIP41 is capable of safely dissipate 7.564 watts.

CUI DEVICES

date 02/10/2020
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SERIES: HSE-BX-02 | **DESCRIPTION:** HEAT SINK

FEATURES
- TO-220 package
- placement pins for secure PCB attachment
- round hole for component attachment
- multiple available cut lengths

RoHS

MODEL	length (mm)	thermal resistance[1] @ 75°C ΔT, nat conv (°C/W)	@ 1 W, nat conv (°C/W)	@ 1 W, 200 LFM (°C/W)	@ 1 W, 400 LFM (°C/W)	power dissipation[1] @ 75°C ΔT, nat conv (W)
HSE-B20254-035H	25.4	12.93	14.40	3.28	2.49	5.80
HSE-B20381-035H	38.1	11.54	13.64	3.66	2.76	6.50
HSE-B20508-035H	50.8	9.62	12.98	5.17	3.28	7.80
HSE-B20508-035H-W[2]	50.8	9.62	12.98	5.17	3.28	7.80
HSE-B20635-035H	63.5	8.15	10.92	4.35	2.86	9.20
HSE-B20635-035H-W[2]	63.5	8.15	10.92	4.35	2.86	9.20

Heatsink Power Dissipation Calculations for the **HSE-20635-035H**:

HSE-B20254-035H Heat Sink, $Thermal\ Resistance = \frac{8.15℃}{1W}$

TIP41, $Thermal\ Resistance = \frac{1.67℃}{1W}$

TIP41, $Maximum\ Temperature = 150℃$

Add Thermal Resistances of the heat sink and the TIP41:

$$Total\ Thermal\ Resistance = \frac{8.15℃}{1W} + \frac{1.67℃}{1W} = \frac{9.82℃}{1W}$$

Design for temperature less than Max TIP Temperature:

$$MaxTemp_{Design} = 90\%(TIPMaxTemp)$$

$$MaxTemp_{Design} = 90\%(150℃)$$

$$MaxTemp_{Design} = 0.9(150℃)$$

$$MaxTemp_{Design} = 135℃$$

Factor in ambient temperature:

$$MaxTempDesign_{W/ambient} = 135℃ - Ambient$$

$$MaxTempDesign_{W/ambient} = 135℃ - 25℃$$

$$MaxTempDesign_{W/ambient} = 110℃$$

Maximum Power Dissipation Calculations:

$$Total\ Thermal\ Resistance = \frac{9.82℃}{1W}$$

$$MaxTempDesign_{W/ambient} = 110℃$$

$$\frac{9.82℃}{1W} = \frac{110℃}{Maximum\ Power\ Dissipation}$$

$$Maximum\ Power\ Dissipation = \frac{1W \times 110℃}{9.82℃}$$

$$Maximum\ Power\ Dissipation = \frac{1W \times 110\cancel{℃}}{9.82\cancel{℃}}$$

$$Maximum\ Power\ Dissipation = \frac{110W}{9.82}$$

Notice that everything stays the same in the numerator and the denominator is the new to Total Thermal Resistance.

$$Maximum\ Power\ Dissipation = 11.202\ watts$$

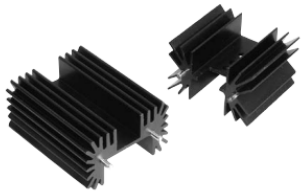
The HSE-B20254-035H with a TIP41 is capable of safely dissipate <u>11.202 watts</u>.

F and R Series Heatsinks

For TO-218, TO-220 and TO-247 devices

FEATURES

- For vertical mounting with solderable pins
- For TO-220, TO-218, TO-247



SERIES SPECIFICATIONS

Heatsink Part Number	Height (in. ±.010 / *mm ±.25*)	For Package Type	Ohmite Resistor Series	Surface Area (mm^2)	Weight (g)	Thermal Res.* (°C/W)
RA-T2X-25E	1.0/25.4	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	8,901	25	4.8
RA-T2X-38E	1.5/38.1	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	12,983	38	3.9
RA-T2X-51E	2.0/50.8	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	17,065	51	3.5
RA-T2X-64E	2.5/63.5	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	21,148	63	3.1
FA-T220-25E	1.0 / 25.4	TO-220, -218, -247	TBH25,TCH35, TEH70, TEH100	9,285	18	4.7

Heatsink Power Dissipation Calculations for the **RA-T2X-38E & RA-T2X-64E:**

RA-T2X-38E $Thermal\ Resistance\ = \frac{3.9℃}{1W}$

$$Total\ Thermal\ Resistance = \frac{3.9℃}{1W} + \frac{1.67℃}{1W} = \frac{5.57℃}{1W}$$

$$\mathbf{RA-T2X-38E}\ Maximum\ Power\ Dissipation = \frac{110W}{Total\ Thermal\ Resistance} = \frac{110W}{5.57}$$

$$\mathbf{RA-T2X-38E}\ Maximum\ Power\ Dissipation = \mathbf{19.57\ watts}$$

RA-T2X-64E $Thermal\ Resistance\ = \frac{3.1℃}{1W}$

$$Total\ Thermal\ Resistance = \frac{3.1℃}{1W} + \frac{1.67℃}{1W} = \frac{4.77℃}{1W}$$

$$\mathbf{RA-T2X-64E}\ Maximum\ Power\ Dissipation = \frac{110W}{Total\ Thermal\ Resistance} = \frac{110W}{4.77}$$

$$\mathbf{RA-T2X-64E}\ Maximum\ Power\ Dissipation = \mathbf{23.1\ watts}$$