



PRODUCT NAME : 2N5038 NPN Power Transistor

PRICE : Rs 20.00

SKU : RM2072

DESCRIPTION



Features

- Collector-Emitter Volt (V_{ce0}): 150V
- Collector-Base Volt (V_{cbo}): 150V
- Collector Current (I_c): 20.0A
- h_{fe} : 20-100 @ 12.0A
- Power Dissipation (P_{tot}): 140W
- Type: NPN

MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

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NPN Silicon Transistors

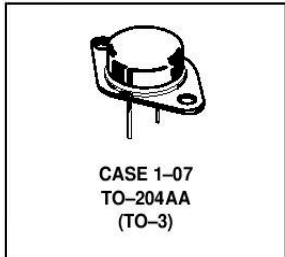
... fast switching speeds and high current capacity ideally suit these parts for use in switching regulators, inverters, wide-band amplifiers and power oscillators in industrial and commercial applications.

- High Speed — $t_f = 0.5 \mu s$ (Max)
- High Current — $I_{C(max)} = 30$ Amps
- Low Saturation — $V_{CE(sat)} = 2.5$ V (Max) @ $I_C = 20$ Amps

2N5038*
2N5039

*Motorola Preferred Device

20 AMPERE
NPN SILICON
POWER TRANSISTORS
75 and 90 VOLTS
140 WATTS



***MAXIMUM RATINGS**

Rating	Symbol	2N5038	2N5039	Unit
Collector-Base Voltage	V_{CB0}	150	120	Vdc
Collector-Emitter Voltage	V_{CEV}	150	120	Vdc
Emitter-Base Voltage	V_{EBO}	7		Vdc
Collector Current — Continuous	I_C	20		Adc
Peak (1)	I_{CM}	30		
Base Current — Continuous	I_B	5		Adc
Total Device Dissipation @ $T_C = 25^\circ C$ Derate above $25^\circ C$	P_D	140		Watts
		0.8		W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.25	°C/W

* Indicates JEDEC Registered Data.

(1) Pulse Test: Pulse Width ≤ 10 ms, Duty Cycle $\leq 50\%$.

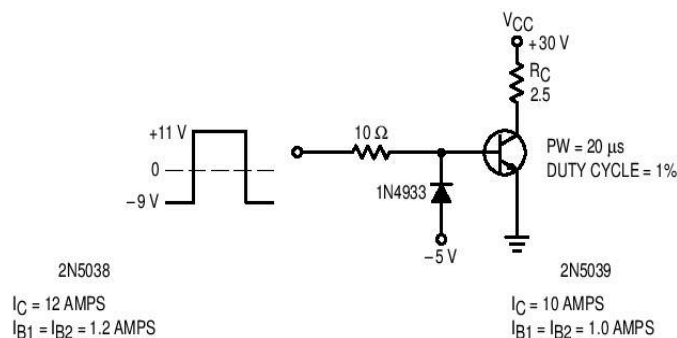


Figure 1. Switching Time Test Circuit

Preferred devices are Motorola recommended choices for future use and best overall value.

REV 7



2N5038 2N5039

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) ($I_C = 200\text{ mA}$, $I_B = 0$)	2N5038 2N5039	90 75	— —	Vdc
Collector Cutoff Current ($V_{CE} = 140\text{ Vdc}$, $V_{BE(\text{off})} = 1.5\text{ V}$) ($V_{CE} = 110\text{ Vdc}$, $V_{BE(\text{off})} = 1.5\text{ V}$) ($V_{CE} = 100\text{ Vdc}$, $V_{BE(\text{off})} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$) ($V_{CE} = 85\text{ Vdc}$, $V_{BE(\text{off})} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$)	2N5038 2N5039 2N5038 2N5039	— — — —	50 50 10 10	mAdc
Emitter Cutoff Current ($V_{EB} = 5\text{ Vdc}$, $I_C = 0$) ($V_{EB} = 7\text{ Vdc}$, $I_C = 0$)	2N5038 2N5039 Both	— — —	5 15 50	mAdc
ON CHARACTERISTICS (1)				
DC Current Gain ($I_C = 12\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 10\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$)	2N5038 2N5039	20 20	100 100	—
Collector-Emitter Saturation Voltage ($I_C = 20\text{ Adc}$, $I_B = 5\text{ Adc}$)		—	2.5	Vdc
Base-Emitter Saturation Voltage ($I_C = 20\text{ Adc}$, $I_B = 5\text{ Adc}$)		—	3.3	Vdc
DYNAMIC CHARACTERISTICS				
Magnitude of Common-Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio ($I_C = 2\text{ Adc}$, $V_{CE} = 10\text{ Vdc}$, $f = 5\text{ MHz}$)		h_{fe}	12	—
SWITCHING CHARACTERISTICS				
RESISTIVE LOAD				
Rise Time	($V_{CC} = 30\text{ Vdc}$)	t_r	—	0.5 μs
Storage Time	($I_C = 12\text{ Adc}$, $I_{B1} = I_{B2} = 1.2\text{ Adc}$)	2N5038	t_s	—
Fall Time	($I_C = 10\text{ Adc}$, $I_{B1} = I_{B2} = 1\text{ Adc}$)	2N5039	t_f	—

* Indicates JEDEC Registered Data.
 (1) Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$.

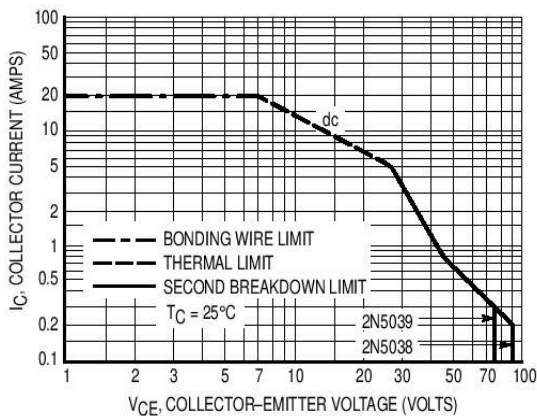


Figure 2. Forward Bias Safe Operating Area

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.

Second breakdown pulse limits are valid for duty cycles to 10%. At high case temperatures, thermal limitations may reduce the power that can be handled to values less than the limitations imposed by second breakdown.

