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2N5038 & 2N5039 Silicon NPN Transistor Power Amp, Switch TO-3 Type Package

Description:

The 2N5038 and 2N5039 are silicon NPN transistors in a TO-3 type package that have fast switching speeds and high current capacity that ideally suit these devices for use in switching regulators, inverters, wide-band amplifiers and power oscillators in industrial and commercial applications.

Features:

- High Speed: $t_f = 0.5\mu s$ Max.
- High Current: $I_C(max) = 30A$
- Low Collector-Emmitter Saturation Voltage: $V_{CE(sat)} = 2.5V$ max @ $I_C = 20A$

Absolute Maximum Ratings:

Collector-Base Voltage, V_{CBO}		
2N5038	.....	150V
2N5039	.....	120V
Collector-Emmitter Voltage, V_{CEV}		
2N5038	.....	150V
2N5039	.....	120V
Emitter-Base Voltage, V_{EBO}		7V
Collector Current, I_C		
Continuous	.....	20A
Peak (Note 1)	.....	30A
Continuous Base Current, I_B		5A
Total Device Dissipation ($T_C = +25^\circ C$), P_D		140W
Derate Above $25^\circ C$		0.8W/ $^\circ C$
Operating Junction Temperature Range, T_J		-65° to $+200^\circ C$
Storage Temperature Range, T_{stg}		-65° to $+200^\circ C$
Maximum Thermal Resistance, Junction-to-Case, R_{thJC}		1.25 $^\circ C/W$

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

Electrical Characteristics: ($T_C = +25^\circ C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
OFF Characteristics							
Collector-Emmitter Sustaining Voltage 2N5038	$V_{CEO(sus)}$	$I_C = 200mA, I_B = 0, \text{ Note 2}$	90	-	-	V	
			75	-	-	V	
Collector Cutoff Current 2N5038	I_{CEX}	$V_{CE} = 140V$	$V_{EB(off)} = 1.5V$	-	-	50	mA
				$V_{CE} = 110V$	-	-	50	mA
		$V_{CE} = 100V$	$V_{EB(off)} = 1.5V,$ $T_C = +150^\circ C$	-	-	10	mA
				$V_{CE} = 85V$	-	-	10	mA

Note 2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

Electrical Characteristics (Cont'd): ($T_C = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Emitter Cutoff Current 2N5038	I_{EBO}	$V_{BE} = 5V, I_C = 0$	-	-	5	mA	
2N5039			-	-	15	mA	
Both		$V_{BE} = 7V, I_C = 0$	-	-	50	mA	
ON Characteristics (Note 2)							
DC Current Gain 2N5038	h_{FE}	$V_{CE} = 5V$	$I_C = 12A$	20	-	100	
2N5039				$I_C = 10A$	20	-	100
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 20A, I_B = 5A$	-	-	2.5	V	
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 20A, I_B = 5A$	-	-	3.3	V	
Dynamic Characteristics							
Magnitude of Common-Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	$|h_{fe}|$	$V_{CE} = 10V, I_C = 2A, f = 5MHz$	12	-	-		
Switching Characteristics (Resistive Load)							
2N5038 Rise Time	t_r	$V_{CC} = 30V, I_C = 12A, I_{B1} = I_{B2} = 1.2A$	-	-	0.5	μs	
Storage Time	t_s		-	-	1.5	μs	
Fall Time	t_f		-	-	0.5	μs	
2N5039 Rise Time	t_r	$V_{CC} = 30V, I_C = 10A, I_{B1} = I_{B2} = 1A$	-	-	0.5	μs	
Storage Time	t_s		-	-	1.5	μs	
Fall Time	t_f		-	-	0.5	μs	

Note 2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

