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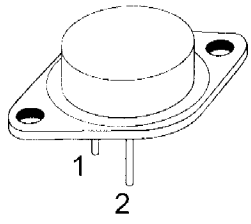
2N5038

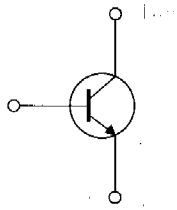
HIGH CURRENT NPN SILICON TRANSISTOR

DESCRIPTION
The 2N5038 is a silicon planar multiepitaxial NPN transistors in Jedec TO-3 metal case. They are especially intended for high current and switching applications.



TO-3

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-Base Voltage (I_E = 0)	150	V
V_{CEX}	Collector-Emitter Voltage (V_{BE}=-1.5V R_{BE}=100Ω)	150	V
V_{CER}	Collector-Emitter Voltage (R_{BE} < 50Ω)	110	V
V_{CEO}	Collector-Emitter Voltage (I_B = 0)	90	V
V_{EBO}	Emitter-Base Voltage (I_C = 0)	7	V
I_C	Collector Current	20	A
I_{CM}	Collector Peak Current	30	A
I_B	Base Current	5	A
P_{tot}	Total Dissipation at $T_c \leq 25$ °C	140	W
T_{stg}	Storage Temperature	-65 to 200	°C

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1.25	°C/W

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEV}	Collector Cut-off Current (V_{BE} = -1.5V)	V_{CE} = 140 V V_{CE} = 100 V T_c = 150 °C			50 10	mA mA
I_{CEO}	Collector Cut-off Current (I_B = 0)	V_{CE} = 70 V			20	mA
I_{EBO}	Emitter Cut-off Current (I_C = 0)	V_{EB} = 7 V V_{EB} = 5 V			50 5	mA mA
$V_{CEO(sus)}$*	Collector-Emitter Sustaining Voltage	I_C = 0.2 A	90			V
$V_{CER(sus)}$*	Collector-Emitter Sustaining Voltage	I_C = 0.2 A R_{BE} = 50 Ω	110			V
$V_{CEX(sus)}$*	Collector-Emitter Sustaining Voltage	I_C = 0.2 A R_{BE} = 100 Ω V_{BE} =-1.5V	150			V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 12 A I_B = 1.2 A I_C = 20 A I_B = 5 A			1 2.5	V V
$V_{BE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 20 A I_B = 5 A			3.3	V
V_{BE}*	Base-Emitter Voltage	I_C = 12 A V_{CE} = 5 V			1.8	V
h_{FE}*	DC Current Gain	I_C = 2 A V_{CE} = 5 V I_C = 12 A V_{CE} = 5 V	50 20		250 100	
h_{fe}	Small Signal Current Gain	I_C = 2 A V_{CE} = 10 V f = 5 MHz	12			
C_{CBO}	Collector-Base Capacitance	I_E = 0 V_{CB} = 10 V f = 1 MHz			300	pF
t_r t_s t_f	Rise Time Storage Time Fall Time	I_C = 12 A V_{CC} = 30 V I_{B1} = -I_{B2} = 1.2A			0.5 1.5 0.5	µs µs µs
$I_{s/b}$**	Second Breakdown Collector Current	V_{CE} = 28 V V_{CE} = 45 V	5 0.9			A A
$E_{s/b}$	Second Breakdown Energy	V_{BE} = -4 V R_{BE} = 20 Ω L = 180µH	13			mJ

* Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

** Pulsed: 0.5 s non repetitive pulse.