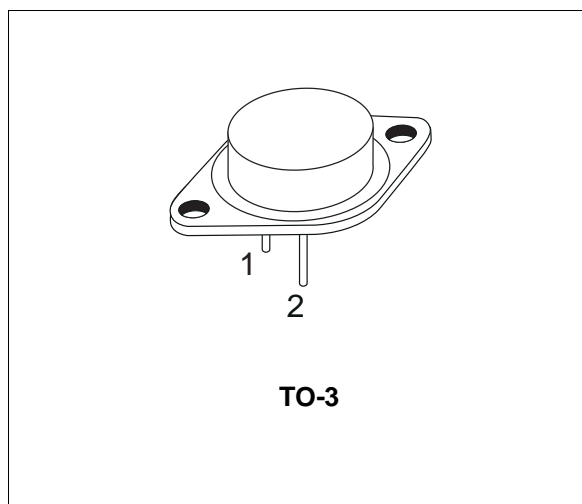


## HIGH CURRENT NPN SILICON TRANSISTOR

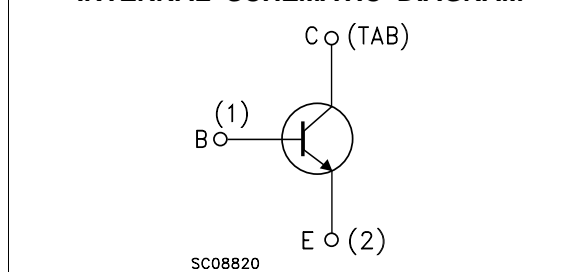
- STMicroelectronics PREFERRED SALESTYPE
- NPN TRANSISTOR

### 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.



### 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 ( $V_{BE} = -1.5V$ $R_{BE} = 100\Omega$ )	150	V
$V_{CER}$	Collector-Emitter Voltage ( $R_{BE} < 50\Omega$ )	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 $T_c \leq 25^\circ C$	140	W
$T_{stg}$	Storage Temperature	-65 to 200	$^\circ C$

## THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case	Max	1.25	$^{\circ}C/W$
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ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

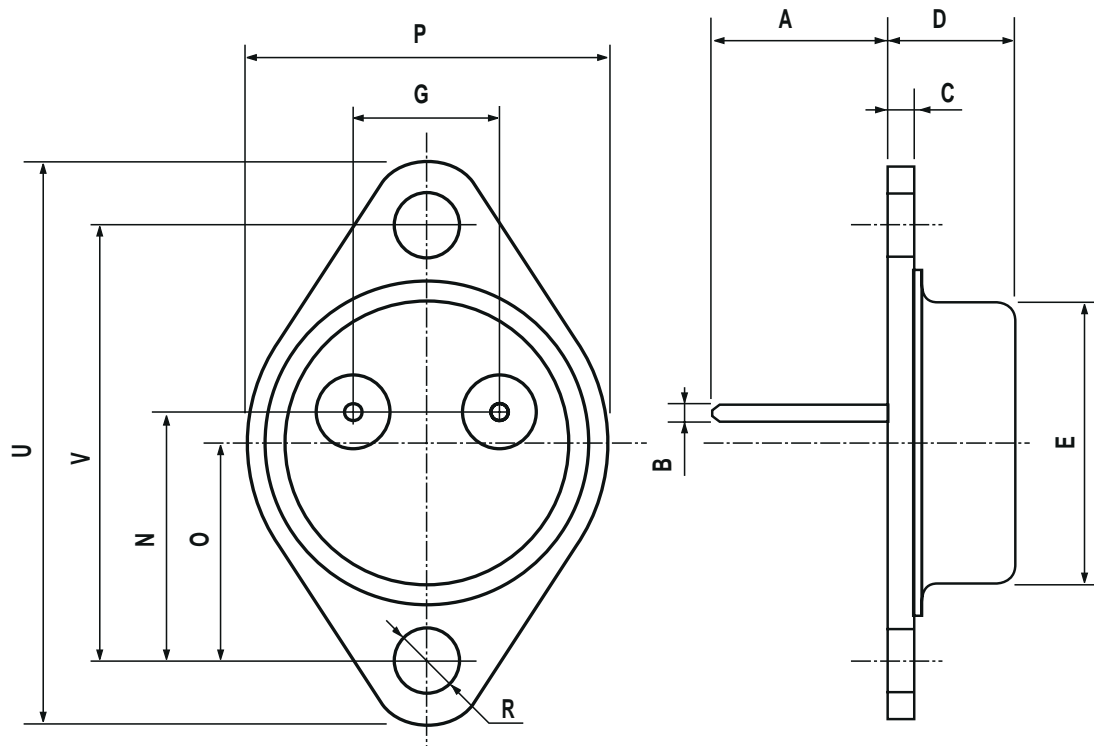
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CEV}$	Collector Cut-off Current ( $V_{BE} = -1.5V$ )	$V_{CE} = 140 V$ $V_{CE} = 100 V \quad T_c = 150^{\circ}C$			50 10	mA mA
$I_{CEO}$	Collector Cut-off Current ( $I_B = 0$ )	$V_{CE} = 70 V$			20	mA
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$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

\* Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %

\*\* Pulsed: 0.5 s non repetitive pulse.

## TO-3 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.00		13.10	0.433		0.516
B	0.97		1.15	0.038		0.045
C	1.50		1.65	0.059		0.065
D	8.32		8.92	0.327		0.351
E	19.00		20.00	0.748		0.787
G	10.70		11.10	0.421		0.437
N	16.50		17.20	0.649		0.677
P	25.00		26.00	0.984		1.023
R	4.00		4.09	0.157		0.161
U	38.50		39.30	1.515		1.547
V	30.00		30.30	1.187		1.193



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