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Small Signal Product

## 300mW, NPN Small Signal Transistor

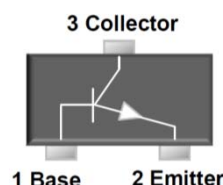
### FEATURES

- Epitaxial planar die construction
- Surface device type mounting
- Moisture sensitivity level 1
- Matte Tin (Sn) lead finish with Nickel (Ni) underplate
- Pb free version and RoHS compliant
- Packing code with suffix "G" means green compound (halogen-free)


**SOT-23**


### MECHANICAL DATA

- Case: SOT- 23, molded plastic
- Terminal: Matte tin plated, lead free, solderable per MIL-STD-202, Method 208 guaranteed
- High temperature soldering guaranteed: 260°C/10s
- Weight: 8 mg (approximately)
- Marking Code: 1E.



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (T <sub>A</sub> =25°C unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Power Dissipation	P <sub>D</sub>	300	mW
Collector-Base Voltage	V <sub>CB0</sub>	60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	40	V
Emitter-Base Voltage	V <sub>EBO</sub>	6	V
Collector Current	I <sub>C</sub>	200	mA
Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Notes: Valid provided that electrodes are kept at ambient temperature

PARAMETER	SYMBOL	MIN	MAX	UNIT	
Collector-Base Breakdown Voltage	I <sub>C</sub> = 10 μA I <sub>E</sub> = 0	V <sub>(BR)CBO</sub>	60	-	V
Collector-Emitter Breakdown Voltage	I <sub>C</sub> = 1 mA I <sub>B</sub> = 0	V <sub>(BR)CEO</sub>	40	-	V
Emitter-Base Breakdown Voltage	I <sub>E</sub> = 10 μA I <sub>C</sub> = 0	V <sub>(BR)EBO</sub>	6	-	V
Collector Cut-off Current	V <sub>CB</sub> = 60 V I <sub>E</sub> = 0	I <sub>CBO</sub>	-	0.1	μA
Collector Cut-off Current	V <sub>CE</sub> = 30 V V <sub>BE(OFF)</sub> = 3 V	I <sub>CEO</sub>	-	50	nA
Emitter Cut-off Current	V <sub>EB</sub> = 5 V I <sub>C</sub> = 0	I <sub>EBO</sub>	-	0.1	μA
DC Current Gain	V <sub>CE</sub> = 1 V I <sub>C</sub> = 10 mA	h <sub>FE</sub>	100	400	
	V <sub>CE</sub> = 1 V I <sub>C</sub> = 50 mA		60	-	
	V <sub>CE</sub> = 1 V I <sub>C</sub> = 100 mA		30	-	
Collector-Emitter Saturation Voltage	I <sub>C</sub> = 50 mA I <sub>B</sub> = 5 mA	V <sub>CE(sat)</sub>	-	0.3	V
Base-Emitter Saturation Voltage	I <sub>C</sub> = 50 mA I <sub>B</sub> = 5 mA	V <sub>BE(sat)</sub>	-	0.95	V
Transition frequency	V <sub>CE</sub> = 20 V I <sub>C</sub> = 10 mA f = 100MHz	f <sub>T</sub>	250	-	MHz
Delay time	V <sub>CC</sub> = 3 V V <sub>BE</sub> = 0.5 V I <sub>C</sub> = 10 mA I <sub>B1</sub> = 1.0 mA	t <sub>d</sub>	-	35	ns
Rise time		t <sub>r</sub>	-	35	ns
Storage time	V <sub>CC</sub> = 3 V I <sub>C</sub> = 10 mA I <sub>B1</sub> = I <sub>B2</sub> = 1.0 mA	t <sub>s</sub>	-	200	ns
Fall time		t <sub>f</sub>	-	50	ns

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**RATINGS AND CHARACTERISTICS CURVES**

( $T_A=25^\circ\text{C}$  unless otherwise noted)

Fig.1 Typical Pulsed Current Gain vs. Collector Current

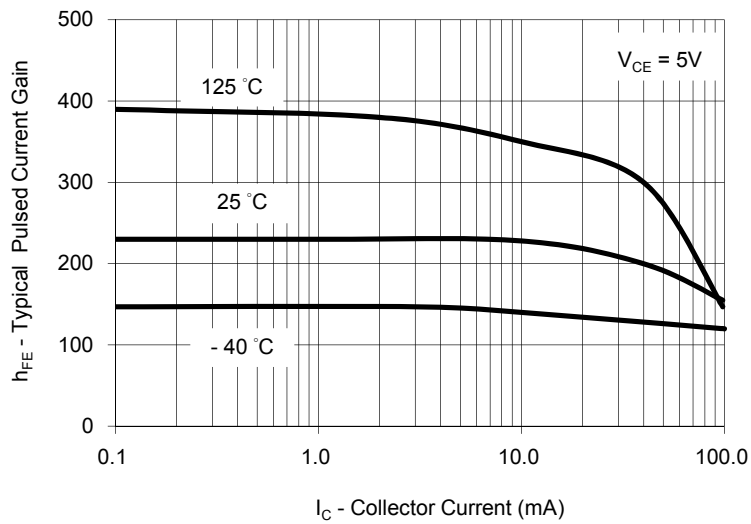


Fig. 2 Collector-Emitter Saturation Voltage vs. Collector Current

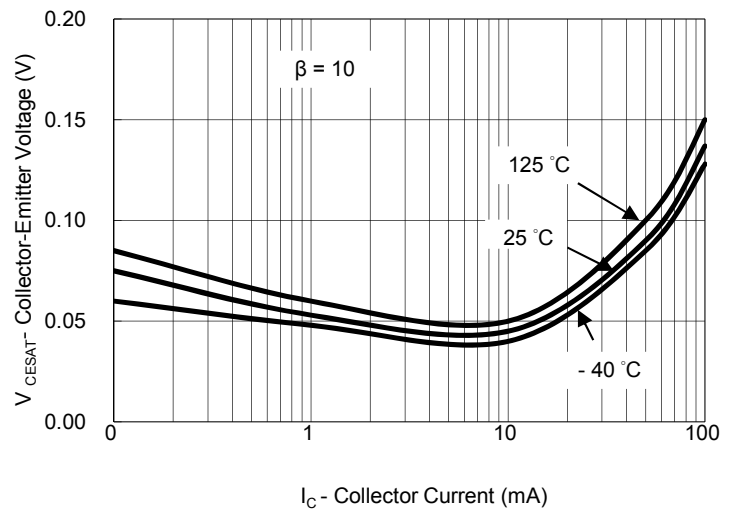


Fig. 3 Base-Emitter Saturation Voltage vs. Collector Current

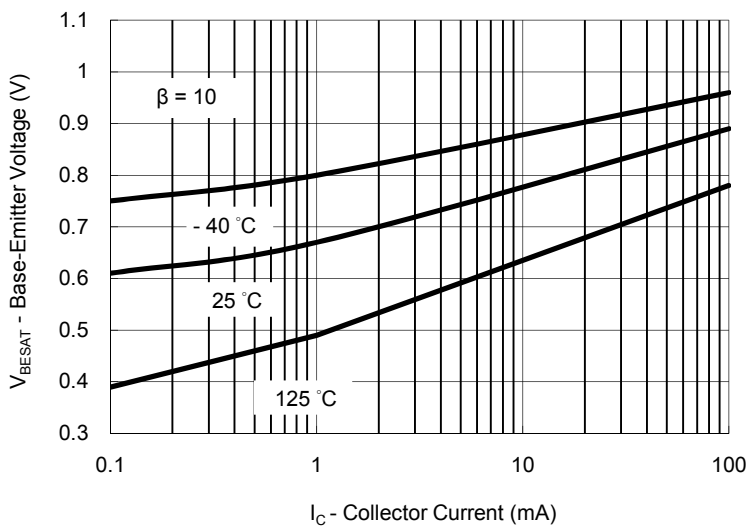


Fig. 4 Base-Emitter On Voltage vs. Collector Current

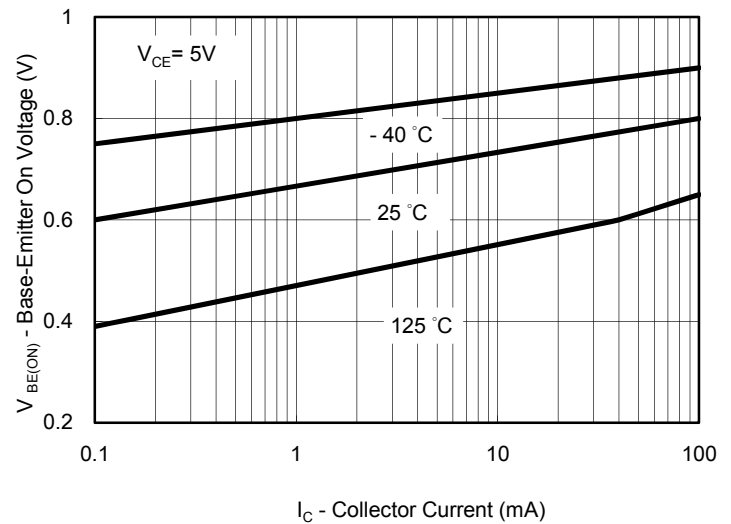


Fig. 5 Collector-Cutoff Current vs. Ambient Temperature

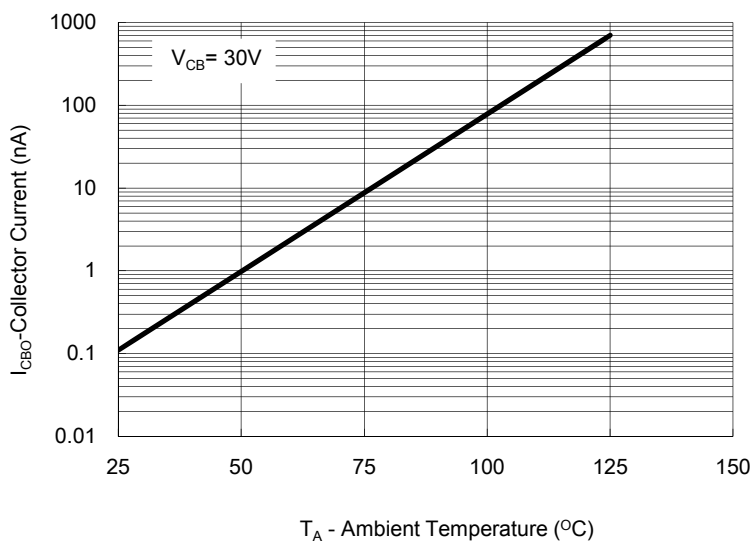
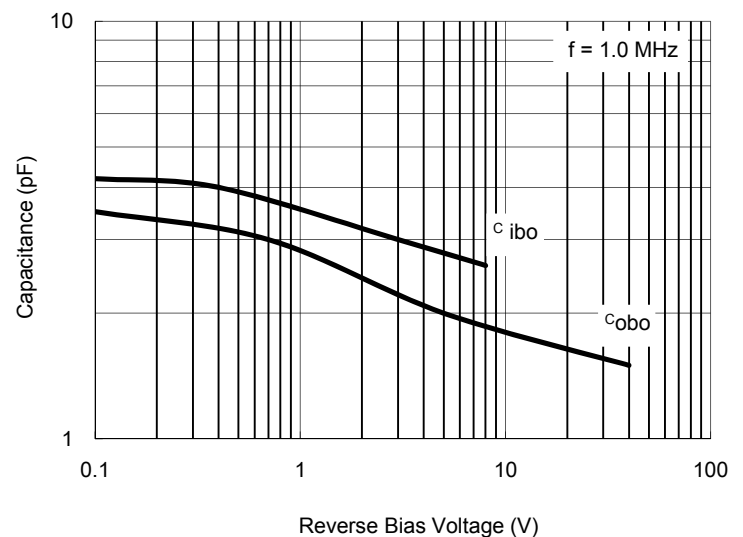


Fig. 6 Capacitance vs. Reverse Bias Voltage

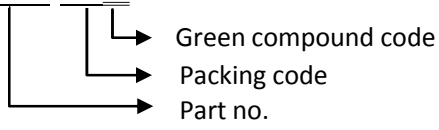




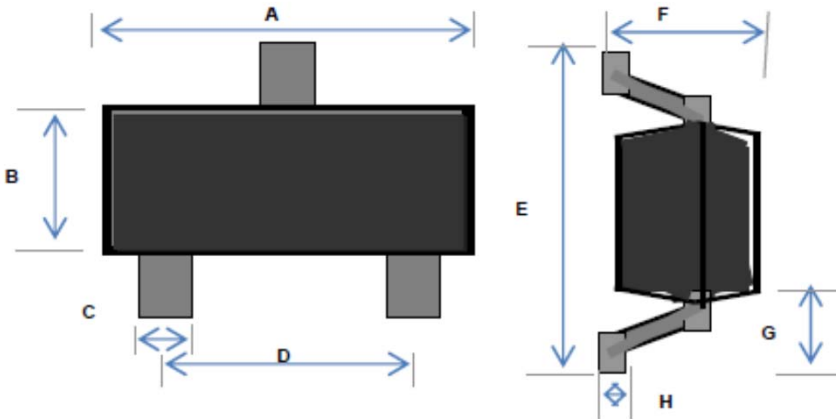
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**ORDER INFORMATION (EXAMPLE)**

MMBT3904L RFG

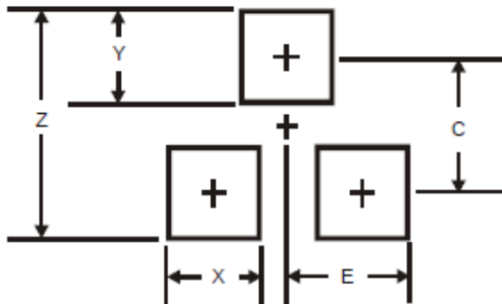


**PACKAGE OUTLINE DIMENSIONS**  
**SOT-23**



DIM.	Unit(mm)		Unit(inch)	
	Min	Max	Min	Max
A	2.70	3.10	0.106	0.122
B	1.10	1.50	0.043	0.059
C	0.30	0.51	0.012	0.020
D	1.78	2.04	0.070	0.080
E	2.10	2.64	0.083	0.104
F	0.89	1.30	0.035	0.051
G	0.55 REF		0.022 REF	
H	0.10 REF		0.004 REF	

**SUGGEST PAD LAYOUT**



DIM	Unit (mm)	Unit (inch)
	TYP	TYP
Z	2.90	0.114
X	0.80	0.031
Y	0.90	0.035
C	2.00	0.079
E	1.35	0.053

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