



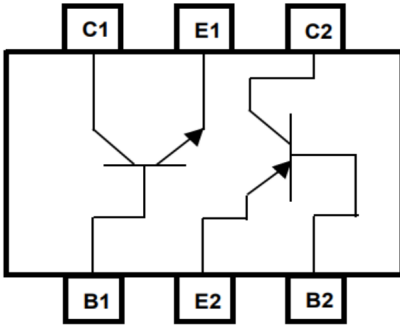
# MMDT3946SG

## Complementary Medium Power Transistors

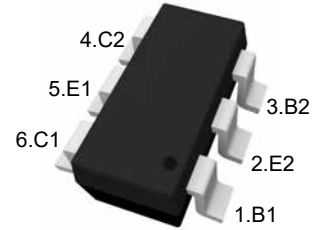
### Features

- For switching and amplifier applications

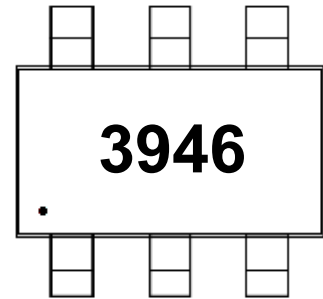
### Equivalent Circuit



### SOT-23-6



### Marking Code



### Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	NPN Transistors	PNP Transistors	Unit
Collector Base Voltage	$V_{CBO}$	60	-40	V
Collector Emitter Voltage	$V_{CEO}$	40	-40	V
Emitter Base Voltage	$V_{EBO}$	6	-6	V
Collector Current	$I_C$	200	-200	mA
Maximum Power Dissipation	$P_D$	1		W
Junction Temperature	$T_J$	150		°C
Storage Temperature Range	$T_{STG}$	-55 to +150		°C



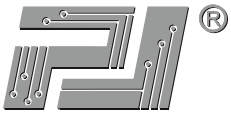
### NPN Electrical Characteristics (T<sub>A</sub>=25°C)

Parameter	Symbol	Min.	Max.	Unit
DC Current Gain at V <sub>CE</sub> = 1 V, I <sub>C</sub> = 0.1 mA at V <sub>CE</sub> = 1 V, I <sub>C</sub> = 1 mA at V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA at V <sub>CE</sub> = 1 V, I <sub>C</sub> = 50 mA at V <sub>CE</sub> = 1 V, I <sub>C</sub> = 100 mA	H <sub>FE</sub>	40 70 100 60 30	-- -- 300 -- --	--
Collector Base Cutoff Current at V <sub>CB</sub> = 30V	I <sub>CBO</sub>	--	.50	nA
Emitter Base Cutoff Current at V <sub>EB</sub> = 6 V	I <sub>EBO</sub>	--	50	nA
Collector Base Breakdown Voltage at I <sub>C</sub> = 10 μA	V <sub>(BR)CBO</sub>	60	--	V
Collector Emitter Breakdown Voltage at I <sub>C</sub> = 1 mA	V <sub>(BR)CEO</sub>	40	--	V
Emitter Base Breakdown Voltage at I <sub>E</sub> = 10 μA	V <sub>(BR)EBO</sub>	6	--	V
Collector Emitter Saturation Voltage at I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1 mA at I <sub>C</sub> = 50 mA, I <sub>B</sub> = 5 mA	V <sub>CE(sat)</sub>	-- --	0.2 0.3	V
Base Emitter Saturation Voltage at I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1 mA at I <sub>C</sub> = 50 mA, I <sub>B</sub> = 5 mA	V <sub>BE(sat)</sub>	0.65 --	0.85 0.95	V
Transition Frequency at V <sub>CE</sub> = 20 V, I <sub>C</sub> = 10 mA, f = 100 MHz	F <sub>T</sub>	300	--	MHz
Output Capacitance at V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0, f = 1 MHz	C <sub>ob</sub>	--	4	pF



### PNP Electrical Characteristics ( $T_A=25^\circ\text{C}$ )

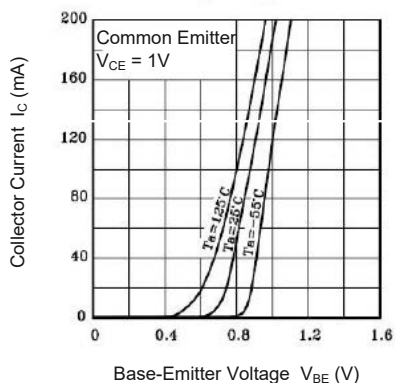
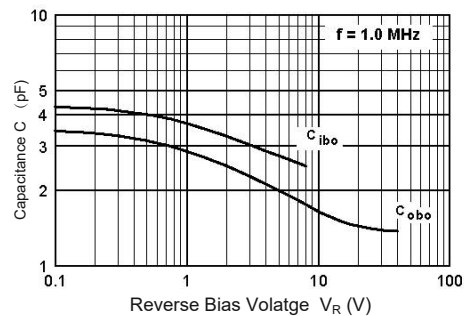
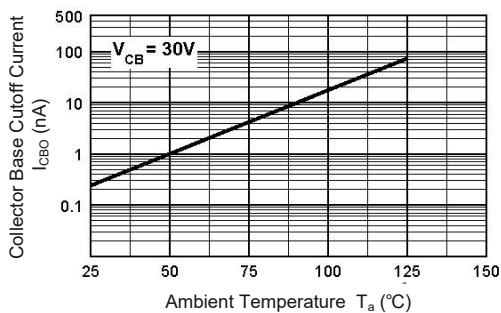
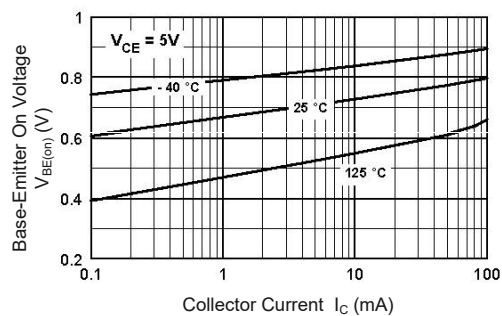
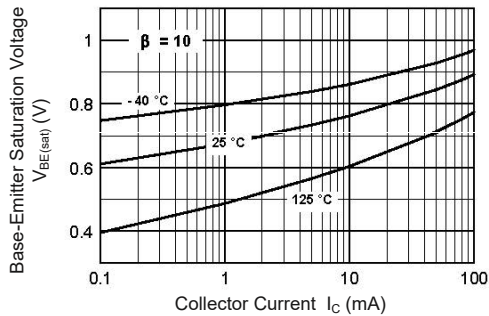
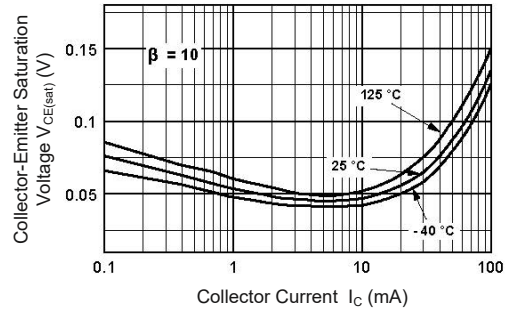
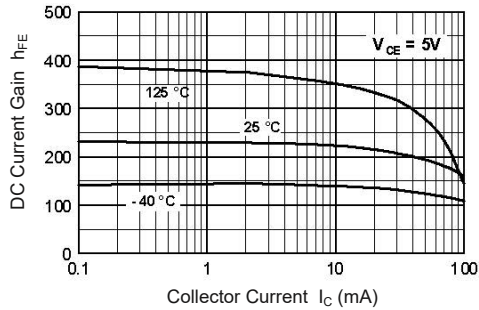
Parameter	Symbol	Min.	Max.	Unit
DC Current Gain at $V_{CE} = -1\text{ V}$ , $I_C = -0.1\text{ mA}$ at $V_{CE} = -1\text{ V}$ , $I_C = -1\text{ mA}$ at $V_{CE} = -1\text{ V}$ , $I_C = -10\text{ mA}$ at $V_{CE} = -1\text{ V}$ , $I_C = -50\text{ mA}$ at $V_{CE} = -1\text{ V}$ , $I_C = -100\text{ mA}$	$H_{FE}$	60 80 100 60 30	-- -- 300 -- --	--
Collector Base Cutoff Current at $V_{CB} = -30\text{ V}$	$-I_{CBO}$	--	.50	nA
Emitter Base Cutoff Current at $V_{EB} = -6\text{ V}$	$-I_{EBO}$	--	50	nA
Collector Base Breakdown Voltage at $I_C = -10\text{ }\mu\text{A}$	$-V_{(BR)CBO}$	40	--	V
Collector Emitter Breakdown Voltage at $I_C = -1\text{ mA}$	$-V_{(BR)CEO}$	40	--	V
Emitter Base Breakdown Voltage at $I_E = -10\text{ }\mu\text{A}$	$-V_{(BR)EBO}$	6	--	V
Collector Emitter Saturation Voltage at $I_C = -10\text{ mA}$ , $I_B = -1\text{ mA}$ at $I_C = -50\text{ mA}$ , $I_B = -5\text{ mA}$	$-V_{CE(sat)}$	-- --	0.25 0.4	V
Base Emitter Saturation Voltage at $I_C = -10\text{ mA}$ , $I_B = -1\text{ mA}$ at $I_C = -50\text{ mA}$ , $I_B = -5\text{ mA}$	$-V_{BE(sat)}$	0.65 --	0.85 0.95	V
Transition Frequency at $V_{CE} = -20\text{ V}$ , $I_C = -10\text{ mA}$ , $f = 100\text{ MHz}$	$F_T$	250	--	MHz
Output Capacitance at $V_{CB} = -5\text{ V}$ , $I_E = 0$ , $f = 1\text{ MHz}$	$C_{ob}$	--	4.5	pF



# MMDT3946SG

## Complementary Medium Power Transistors

### NPN Typical Characteristic Curves

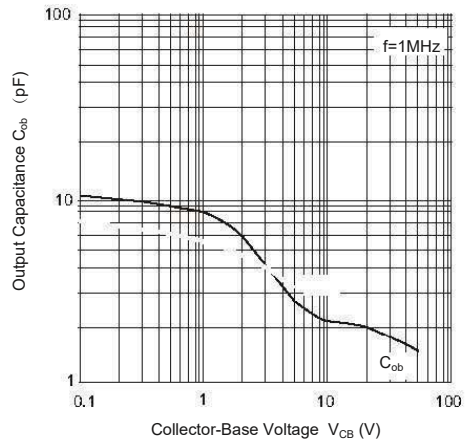
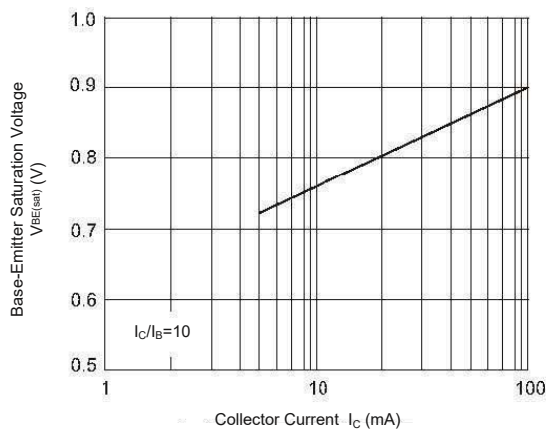
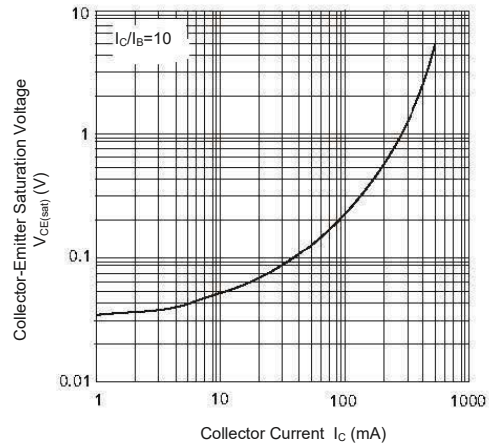
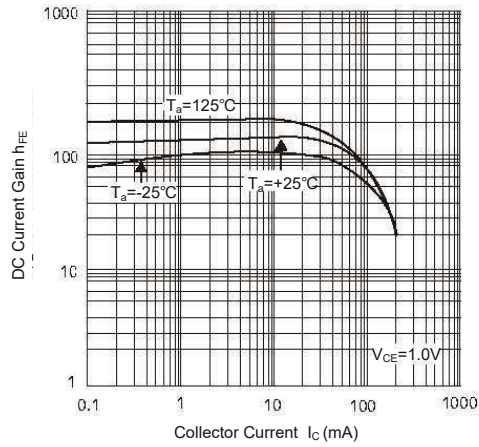




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## Complementary Medium Power Transistors

### PNP Typical Characteristic Curves





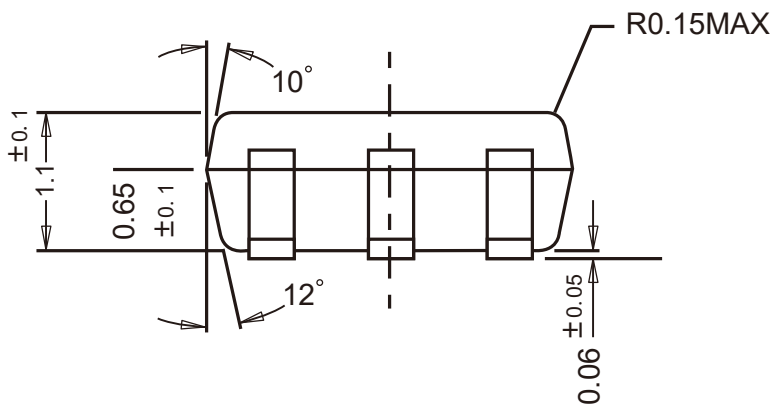
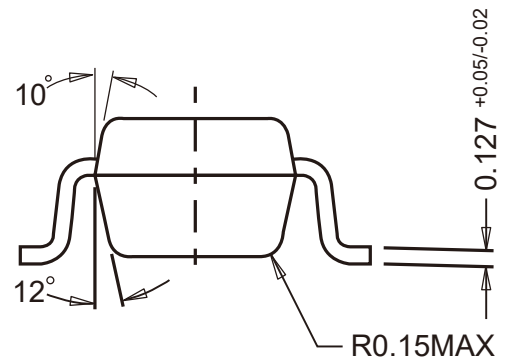
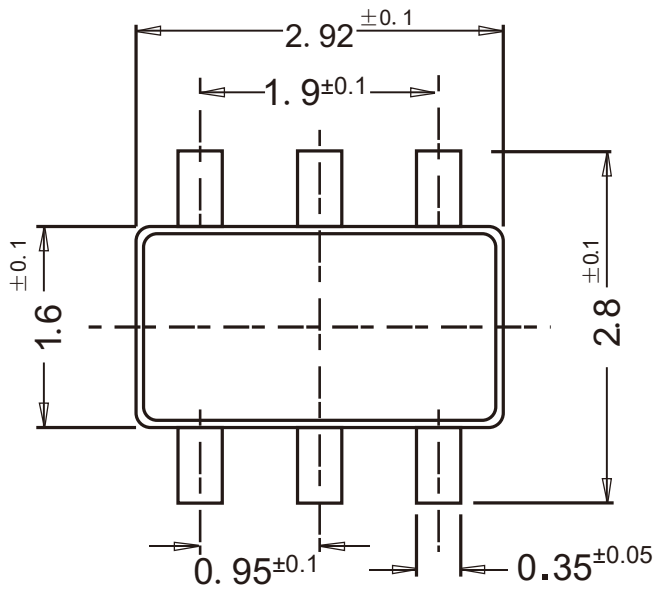
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## Complementary Medium Power Transistors

### Package Outline

SOT-23-6

Dimensions in mm



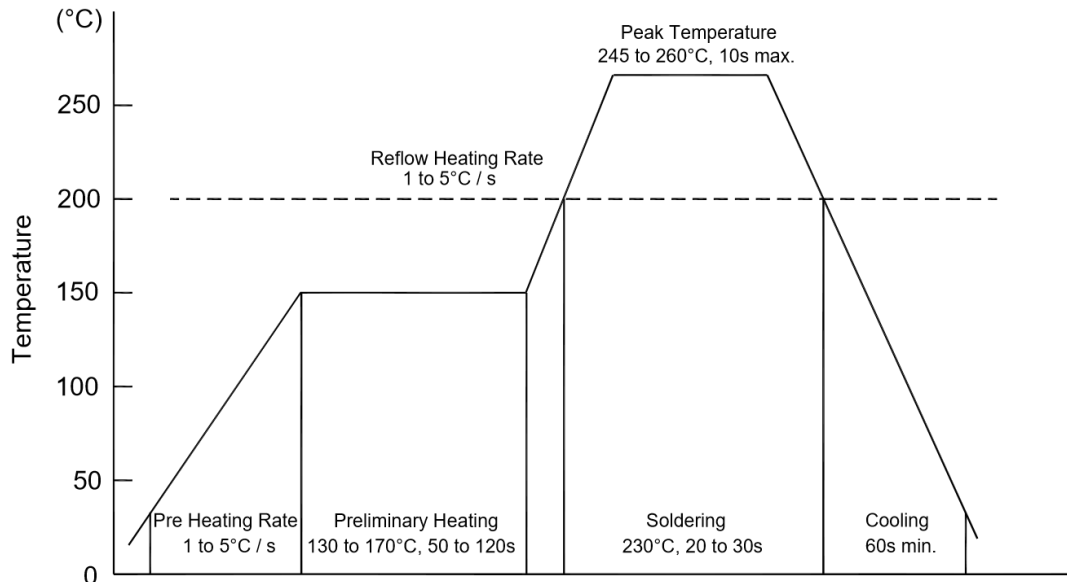
### Ordering Information

Device	Package	Shipping
MMDT3946SG	SOT-23-6	3,000PCS/Reel&7inches



### Conditions of Soldering and Storage

#### ◆ Recommended condition of reflow soldering



Recommended peak temperature is over 245 °C. If peak temperature is below 245 °C, you may adjust the following parameters:

- Time length of peak temperature (longer)
- Time length of soldering (longer)
- Thickness of solder paste (thicker)

#### ◆ Conditions of hand soldering

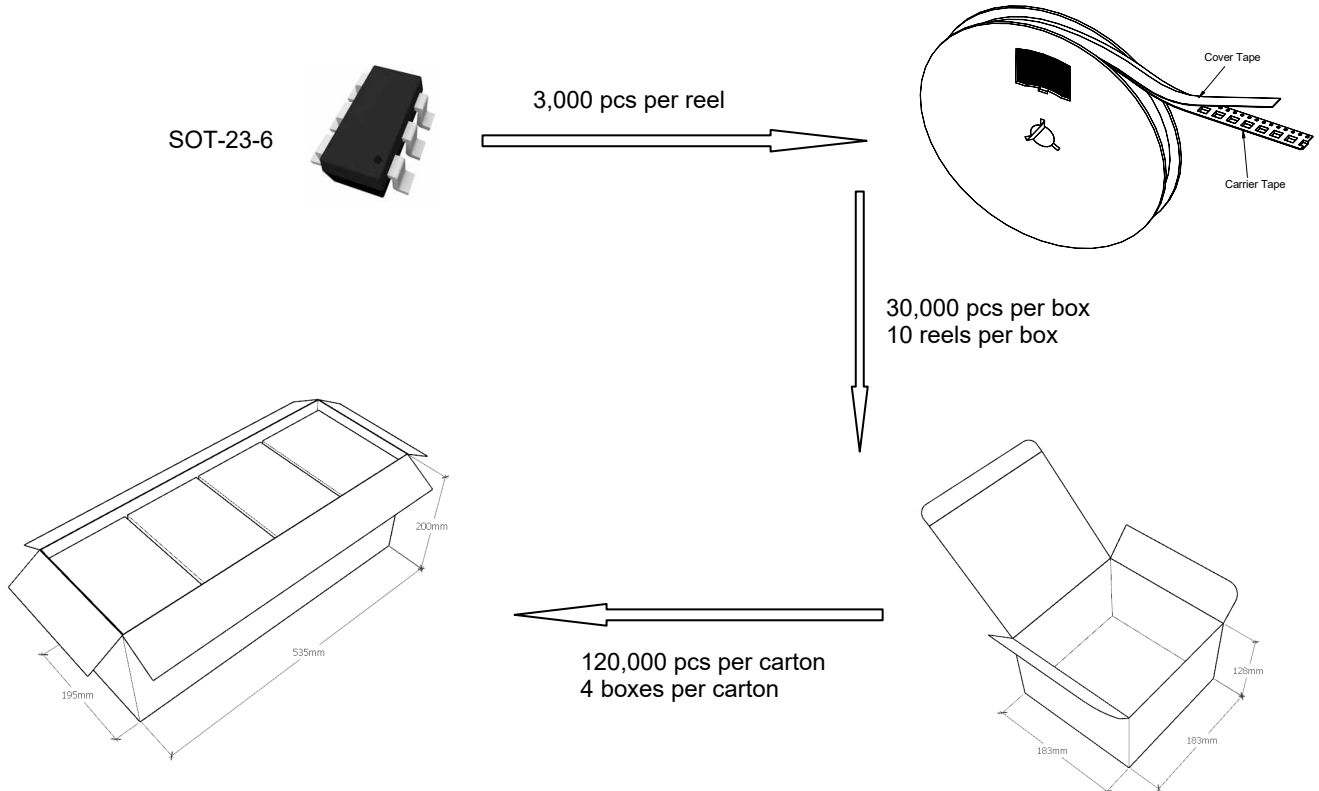
- Temperature: 370 °C
- Time: 3s max.
- Times: one time

#### ◆ Storage conditions

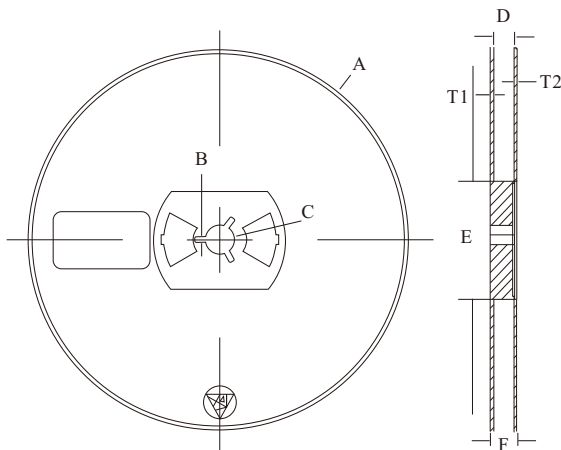
- **Temperature**  
5 to 40 °C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing

### Package Specifications

- The method of packaging

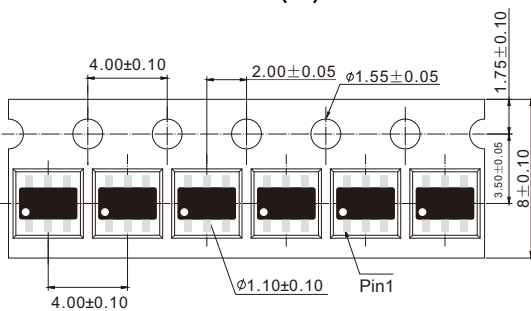


### ◆ Embossed tape and reel data



Symbol	Value (unit: mm)
A	Ø 177.8±1
B	2.7±0.2
C	Ø 13.5±0.2
E	Ø 54.5±0.2
F	12.3±0.3
D	9.6+2/-0.3
T1	1.0±0.2
T2	1.2±0.2

### Reel (7")



### Tape (8mm)