

# MM4036 MM4037

CASE 79-02, STYLE 1  
TO-39 (TO-205AD)

## SWITCHING TRANSISTOR

PNP SILICON

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	65	Vdc
		40	
Collector-Base Voltage	V <sub>CBO</sub>	90	Vdc
		60	
Emitter-Base Voltage	V <sub>EBO</sub>	5.0	Vdc
Base Current	I <sub>B</sub>	500	mA <sub>dc</sub>
Collector Current — Continuous	I <sub>C</sub>	1.0	A <sub>dc</sub>
Total Device Dissipation @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	1.0	Watt
		5.71	mW/°C
Total Device Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	P <sub>D</sub>	7.0	Watts
		40	mW/°C
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-65 to +200	°C

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	25	°C/W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub> (1)	175	°C/W

(1) R<sub>θJA</sub> is measured with the device soldered into a typical printed circuit board.

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit	
<b>OFF CHARACTERISTICS</b>						
Collector-Emitter Breakdown Voltage(2) (I <sub>C</sub> = 10 mA <sub>dc</sub> , I <sub>B</sub> = 0)	MM4036 MM4037	V <sub>(BR)CEO</sub>	65 40	—	Vdc	
Collector-Base Breakdown Voltage (I <sub>C</sub> = 100 μA <sub>dc</sub> , I <sub>E</sub> = 0) (I <sub>C</sub> = 10 μA <sub>dc</sub> , I <sub>E</sub> = 0)	MM4036 MM4037	V <sub>(BR)CBO</sub>	90 60	— —	Vdc	
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 100 μA <sub>dc</sub> , I <sub>C</sub> = 0) (I <sub>E</sub> = 1.0 μA <sub>dc</sub> , I <sub>C</sub> = 0)	MM4036 MM4037	V <sub>(BR)EBO</sub>	5.0 5.0	— —	Vdc	
Collector Cutoff Current(1) (V <sub>CE</sub> = 60 Vdc, V <sub>BE(off)</sub> = 1.5 Vdc) (V <sub>CE</sub> = 30 Vdc, V <sub>BE(off)</sub> = 1.5 Vdc, T <sub>C</sub> = 150°C)	MM4036 MM4036	I <sub>CEV</sub>	— —	250 100	nA <sub>dc</sub> μA <sub>dc</sub>	
Collector Cutoff Current (V <sub>CB</sub> = 60 Vdc, I <sub>E</sub> = 0)	MM4036, MM4037	I <sub>CBO</sub>	—	250	nA <sub>dc</sub>	
Emitter Cutoff Current (V <sub>BE</sub> = 3.0 Vdc, I <sub>C</sub> = 0) (V <sub>BE</sub> = 5.0 Vdc, I <sub>C</sub> = 0)	MM4036 MM4037	I <sub>EBO</sub>	— —	250 1.0	μA <sub>dc</sub>	
<b>ON CHARACTERISTICS(2)</b>						
DC Current Gain (I <sub>C</sub> = 100 μA <sub>dc</sub> , V <sub>CE</sub> = 10 Vdc) (I <sub>C</sub> = 150 mA <sub>dc</sub> , V <sub>CE</sub> = 2.0 Vdc) (I <sub>C</sub> = 150 mA <sub>dc</sub> , V <sub>CE</sub> = 10 Vdc) (I <sub>C</sub> = 500 mA <sub>dc</sub> , V <sub>CE</sub> = 10 Vdc) (I <sub>C</sub> = 1.0 A <sub>dc</sub> , V <sub>CE</sub> = 10 Vdc) (I <sub>C</sub> = 150 mA <sub>dc</sub> , V <sub>CE</sub> = 10 Vdc)	MM4036 MM4036 MM4036 MM4036 MM4037 MM4037	h <sub>FE</sub>	20 20 40 20 15 50	50 60 90 40 50 75	— 200 140 — — 250	—
Collector-Emitter Saturation Voltage (I <sub>C</sub> = 150 mA <sub>dc</sub> , I <sub>B</sub> = 15 mA <sub>dc</sub> )	MM4036 MM4037	V <sub>CE(sat)</sub>	—	0.3 0.3	0.65 1.4	Vdc
Base-Emitter Saturation Voltage (I <sub>C</sub> = 150 mA <sub>dc</sub> , I <sub>B</sub> = 15 mA <sub>dc</sub> )		V <sub>BE(sat)</sub>	—	1.0	1.4	Vdc

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## ELECTRICAL CHARACTERISTICS (continued) ( $T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
Current-Gain — Bandwidth Product(2) ( $I_C = 50\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 20\text{ MHz}$ )	$f_T$	60	100	—	MHz
Input Capacitance ( $V_{BE} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ibo}$	—	60	—	pF
Collector-Base Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{cb}$	—	20	—	pF
		—	20	30	

## SWITCHING CHARACTERISTICS

Turn-On Time	( $V_{CC} = 30\text{ Vdc}$ , $I_C = 150\text{ mAdc}$ , $I_{B1} = 15\text{ mAdc}$ )	$t_{on}$	—	40	75	ns
Turn-Off Time	( $V_{CC} = 6.0\text{ Vdc}$ , $I_C = 150\text{ mAdc}$ , $I_{B1} = I_{B2} = 15\text{ mAdc}$ )	$t_{off}$	—	110	175	ns

(2) Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

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