

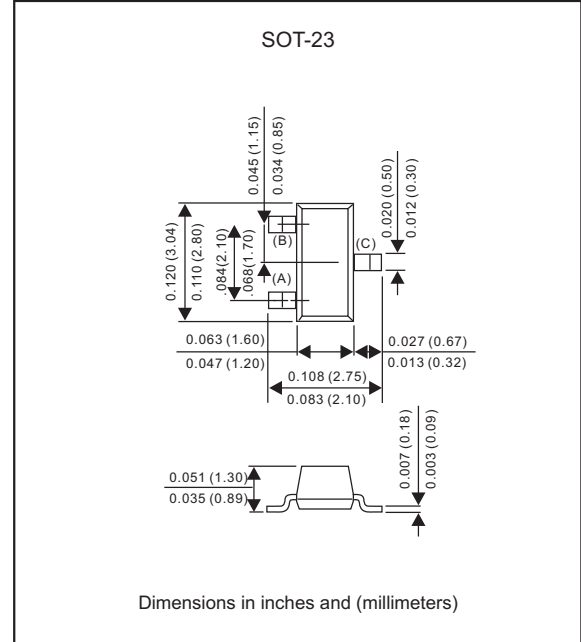
Features

- Epitaxial plana chip construction
- Ideal for medium power application and switching
- Capable of 225mW power dissipation.
- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Compliant to Halogen-free
- Suffix "-Q1" for AEC-Q101

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any

Package outline



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

Parameters	Symbol	Value	Unit
Collector-Base Voltage	V_{CB0}	60	V
Collector-Emitter Voltage	V_{CE0}	40	V
Emitter -Base Voltage	V_{EB0}	6	V
Collector Current-Continuous	I_C	600	mA
Collector Power Dissipation	P_C	300	mW
Junction Temperature	T_j	150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-55-+150	$^{\circ}\text{C}$
Thermal resistance From junction to ambient	$R_{\theta JA}$	417	$^{\circ}\text{C/W}$

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

Parameters	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 100\mu\text{A}, I_E = 0$	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}, I_B = 0$	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = 100\mu\text{A}, I_C = 0$	6			V
Collector cut-off current	I_{CBO}	$V_{CB} = 50\text{V}, I_E = 0$			0.1	μA
Collector cut-off current	I_{CEX}	$V_{CE} = 35\text{V}, V_{EB} = 0.4\text{V}$			0.1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = 5\text{V}, I_C = 0$			0.1	μA
DC current gain	h_{FE1}	$V_{CE} = 1\text{V}, I_C = 0.1\text{mA}$	20			
	h_{FE2}	$V_{CE} = 1\text{V}, I_C = 1\text{mA}$	40			
	h_{FE3}	$V_{CE} = 1\text{V}, I_C = 10\text{mA}$	80			
	h_{FE4}	$V_{CE} = 1\text{V}, I_C = 150\text{mA}$	100		300	
	h_{FE5}	$V_{CE} = 2\text{V}, I_C = 500\text{mA}$	40			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 150\text{mA}, I_B = 15\text{mA}$			0.4	V
		$I_C = 500\text{mA}, I_B = 50\text{mA}$			0.75	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 150\text{mA}, I_B = 15\text{mA}$			0.95	V
		$I_C = 500\text{mA}, I_B = 50\text{mA}$			1.2	V
Transition frequency	f_T	$V_{CE} = 10\text{V}, I_C = 20\text{mA}, f = 100\text{MHz}$	250			MHz
Delay time	t_d	$V_{CC} = 30\text{V}, V_{BE(off)} = -2\text{V}, I_C = 150\text{mA}, I_{B1} = 15\text{mA}$			15	ns
Rise time	t_r				20	ns
Storage time	t_s	$V_{CC} = 30\text{V}, I_C = 150\text{mA}, I_{B1} = I_{B2} = 15\text{mA}$			225	ns
Fall time	t_f				60	ns

SWITCHING TIME EQUIVALENT TEST CIRCUITS

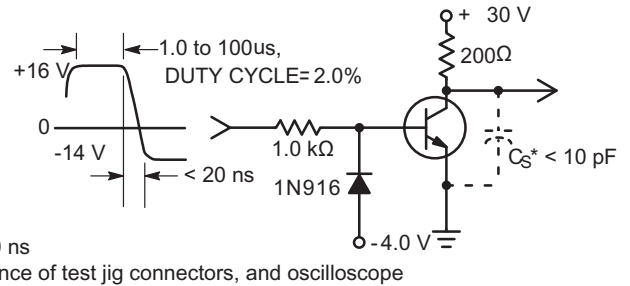
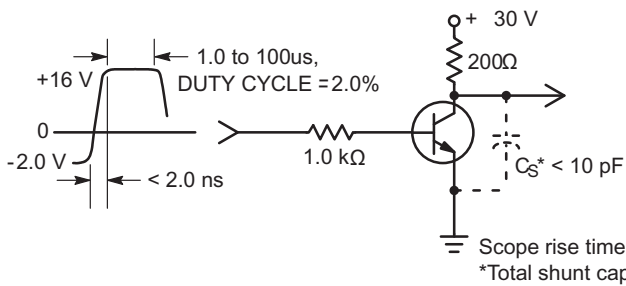


Figure 1. Turn-On Time

Figure 2. Turn-Off Time

TRANSIENT CHARACTERISTICS

— 25°C - - - 105°C

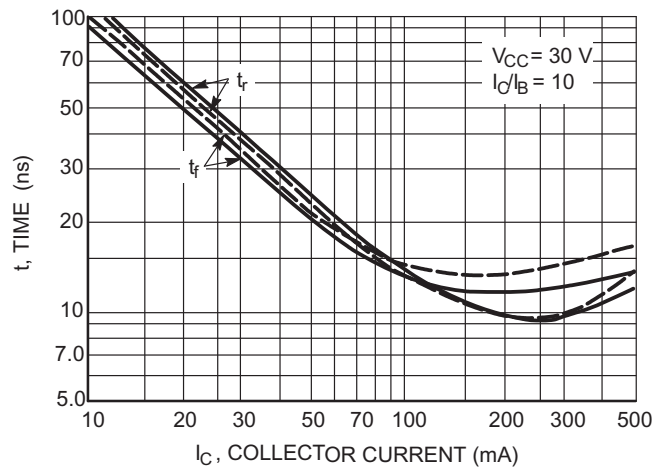
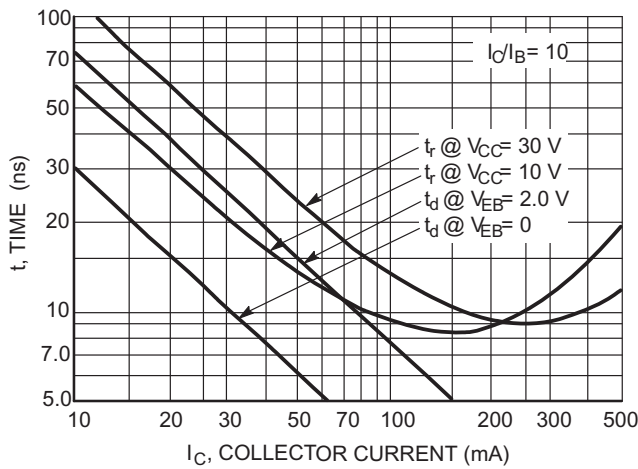
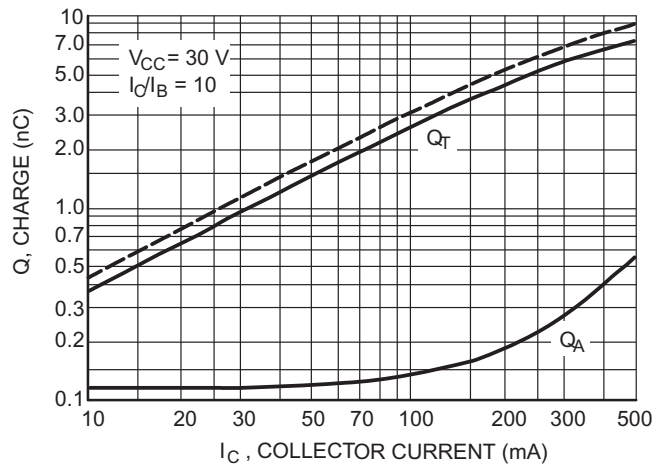
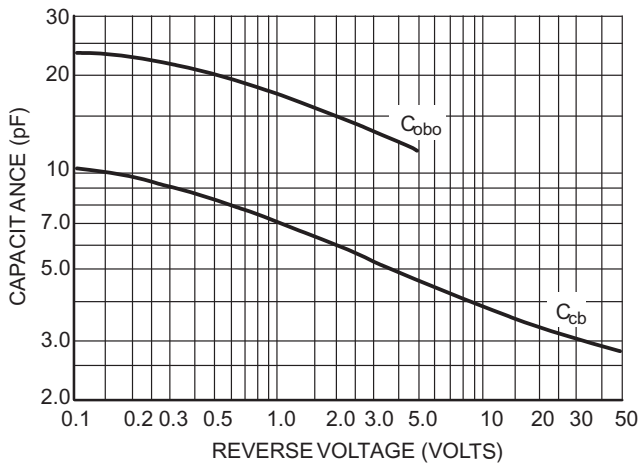


Figure 5. Turn-On Time

Figure 6. Rise and Fall Times

Rating and characteristic curves

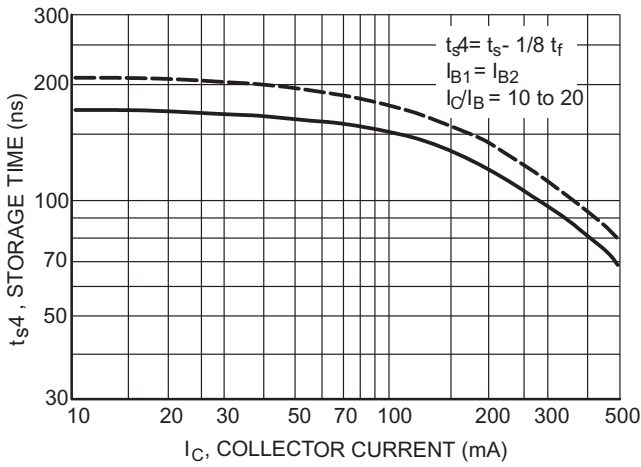


Figure 7. Storage Time

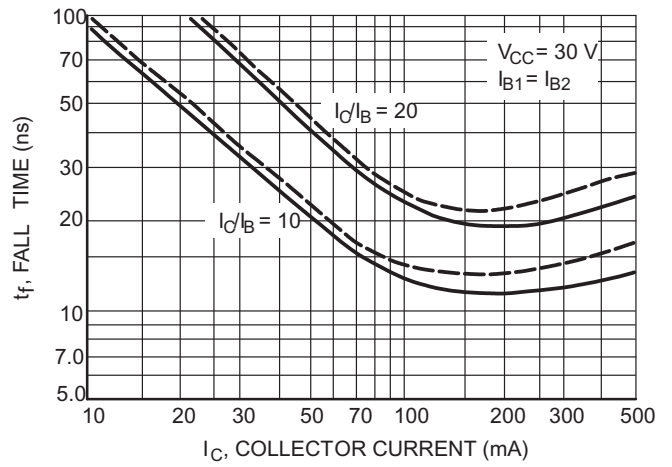


Figure 8. Fall Time

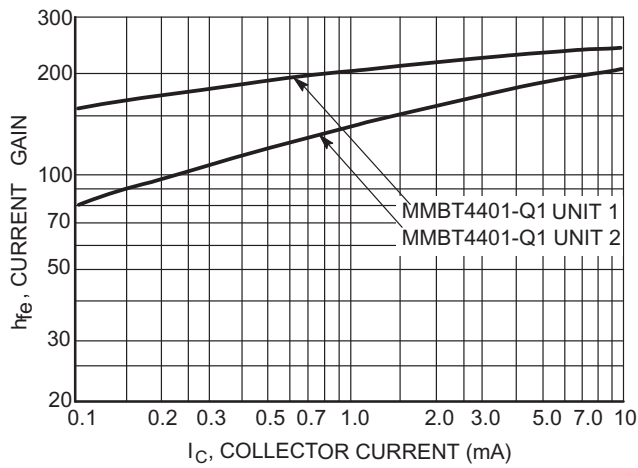


Figure 9. Current Gain

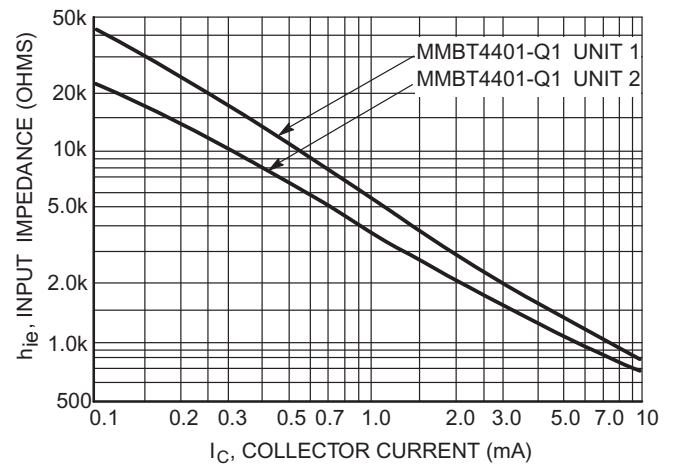


Figure 10. Input Impedance

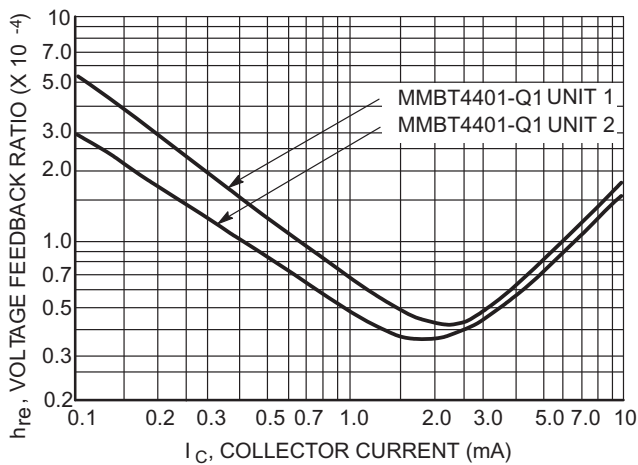


Figure 11. Voltage Feedback Ratio

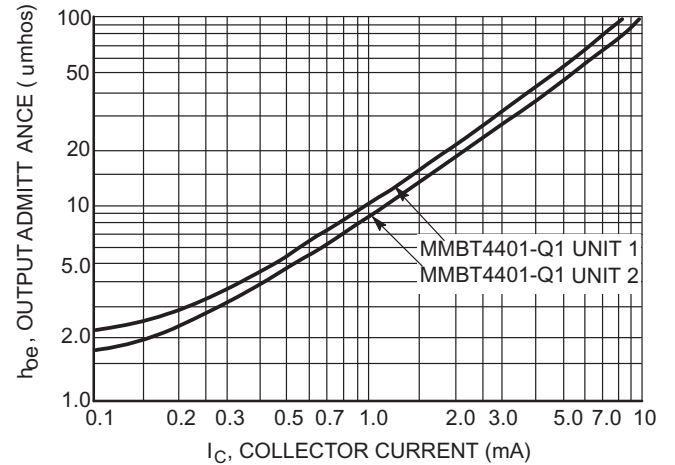


Figure 12. Output Admittance



Rating and characteristic curves

STATIC CHARACTERISTICS

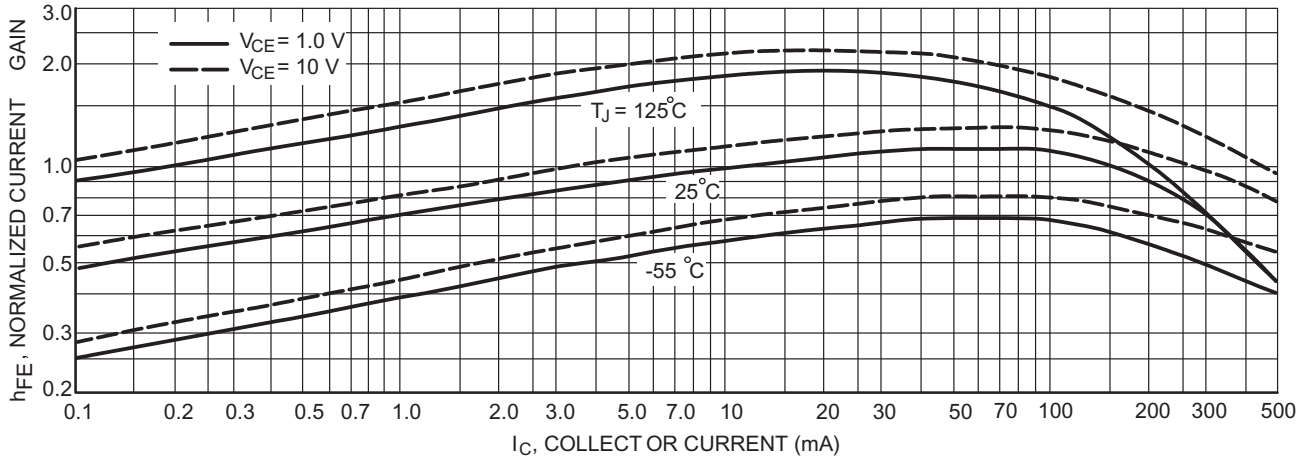


Figure 13. DC Current Gain

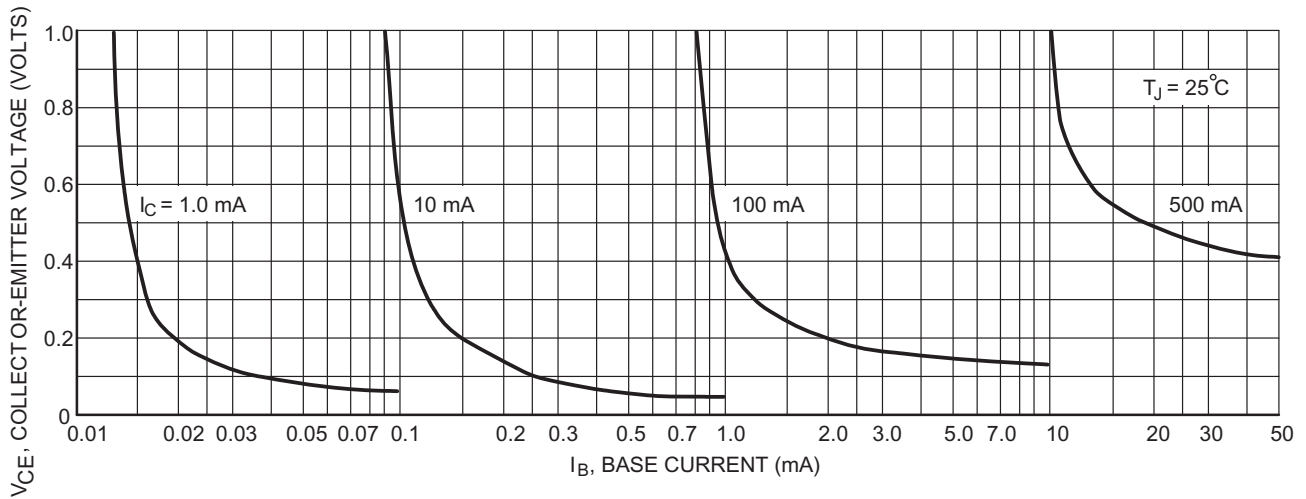


Figure 14. Collector Saturation Region

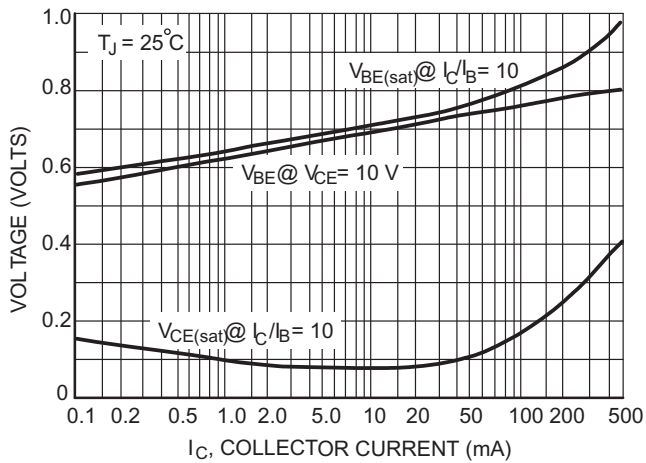


Figure 15. "On" Voltages

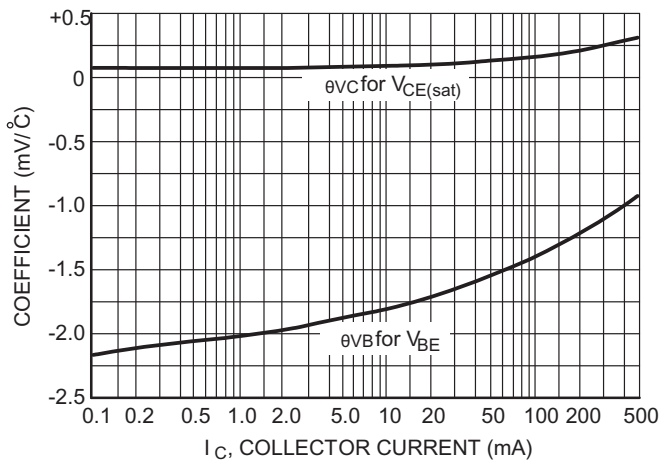
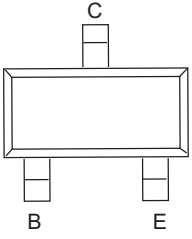
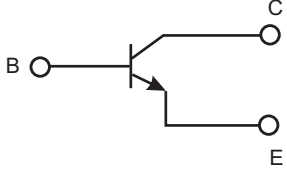


Figure 16. Temperature Coefficients



Pinning information

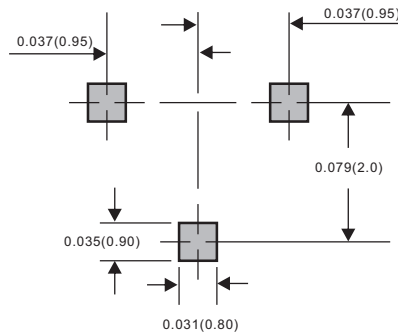
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
MMBT4401-Q1	2X

Suggested solder pad layout

SOT-23



Dimensions in inches and (millimeters)