



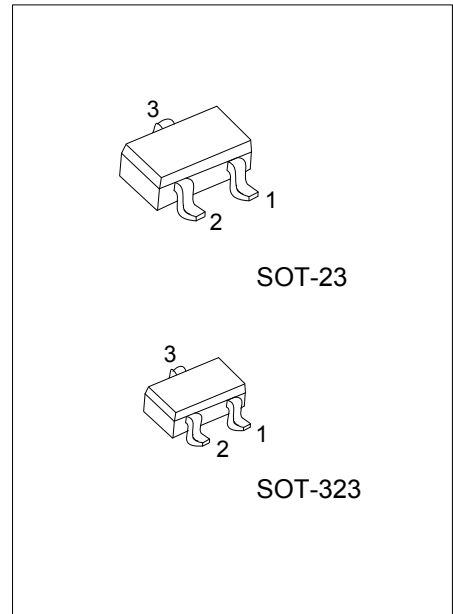
MMBT4403

PNP SILICON TRANSISTOR

PNP GENERAL PURPOSE AMPLIFIER

DESCRIPTION

The UTC **MMBT4403** is designed for use as a general purpose amplifier and switch requiring collector currents up to 500mA.

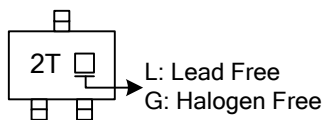


ORDERING INFORMATION

Ordering Number			Package	Pin Assignment			Packing
Normal	Lead Free	Halogen Free		1	2	3	
MMBT4403-AE3-R	MMBT4403L-AE3-R	MMBT4403G-AE3-R	SOT-23	E	B	C	Tape Reel
MMBT4403-AL3-R	MMBT4403L-AL3-R	MMBT4403G-AL3-R	SOT-323	E	B	C	Tape Reel

<p>MMBT4403L-AE3-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Lead Plating</p>	<p>(1) R: Tape Reel</p> <p>(2) AE3: SOT-23, AL3: SOT-323</p> <p>(3) G: Halogen Free, L: Lead Free Plating, Blank: Pb/Sn</p>
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MARKING



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-5	V
Collector Current-Continuous	I_C	-600	mA
Total Device Dissipation	P_C	350	mW
Derate above 25°C		2.8	mW/°C
Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-55 ~ +150	°C

- Note 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

■ THERMAL DATA (Ta=25°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	357	°C /W

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (Note)	BV_{CEO}	$I_C=-1mA, I_B=0$	-40			V
Collector-Base Breakdown Voltage	BV_{CBO}	$I_C=-0.1mA, I_E=0$	-40			V
Emitter-Base Breakdown Voltage	BV_{EBO}	$I_E=-0.1mA, I_C=0$	-5			V
Collector Cut-off Current	I_{CEX}	$V_{CE}=-35V, V_{BE}=-0.4V$			-0.1	μA
Base Cut-off Current	I_{BEX}	$V_{CE}=-35V, V_{BE}=-0.4V$			-0.1	μA
ON CHARACTERISTICS*						
DC Current Gain	h_{FE1}	$V_{CE}=-1V, I_C=-0.1mA$	30			
	h_{FE2}	$V_{CE}=-1V, I_C=-1mA$	60			
	h_{FE3}	$V_{CE}=-1V, I_C=-10mA$	100			
	h_{FE4}	$V_{CE}=-2V, I_C=-150mA$ (Note)	100		300	
	h_{FE5}	$V_{CE}=-2V, I_C=-500mA$ (Note)	20			
Collector-Emitter Saturation Voltage	$V_{CE(SAT1)}$	$I_C=-150mA, I_B=-15mA$			-0.4	V
	$V_{CE(SAT2)}$	$I_C=-500mA, I_B=-50mA$			-0.75	
Base-Emitter Saturation Voltage	$V_{BE(SAT1)}$	$I_C=-150mA, I_B=-15mA$ (Note)	-0.75		-0.95	V
	$V_{BE(SAT2)}$	$I_C=-500mA, I_B=-50mA$			-1.3	
SMALL SIGNAL CHARACTERISTICS						
Transition Frequency	f_T	$V_{CE}=-10V, I_C=-20mA, f=100MHz$	200			MHz
Collector-Base Capacitance	C_{CB}	$V_{CB}=-10V, I_E=0, f=140kHz$			8.5	pF
Emitter-Base Capacitance	C_{EB}	$V_{BE}=-0.5V, I_C=0, f=140kHz$			30	pF
Input Impedance	h_{iE}	$V_{CE}=-10V, I_C=-1mA, f=1kHz$	1.5		15	k Ω
Voltage Feedback Ratio	h_{RE}	$V_{CE}=-10V, I_C=-1mA, f=1kHz$	0.1		8	$\times 10^{-4}$
Small-Signal Current Gain	h_{FE}	$V_{CE}=-10V, I_C=-1mA, f=1kHz$	60		500	
Output Admittance	h_{OE}	$V_{CE}=-10V, I_C=-1mA, f=1kHz$	1.0		100	$\mu mhos$
SWITCHING CHARACTERISTICS						
Delay Time	t_D	$V_{CC}=-30V, I_C=-150mA, I_{B1}=-15mA$			15	ns
Rise Time	t_R				20	
Storage Time	t_S	$V_{CC}=-30V, I_C=-150mA, I_{B1}=I_{B2}=-15mA$			225	ns
Fall Time	t_F				30	

Note: Pulse test: Pulse Width \leq 300 μs , Duty Cycle \leq 2%

■ TEST CIRCUIT

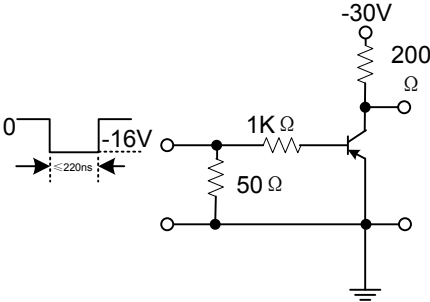


Figure 1. Saturated Turn-On Switching Timer

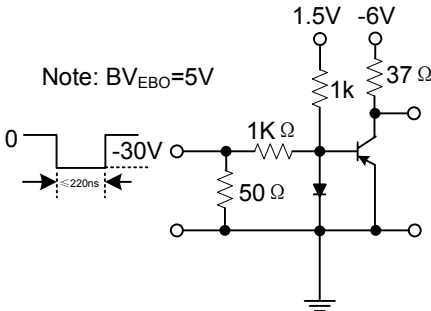
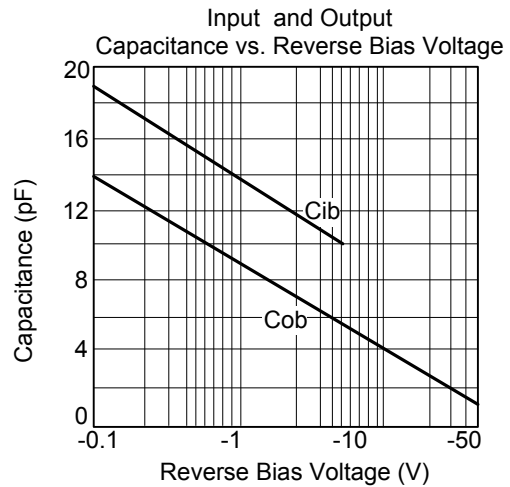
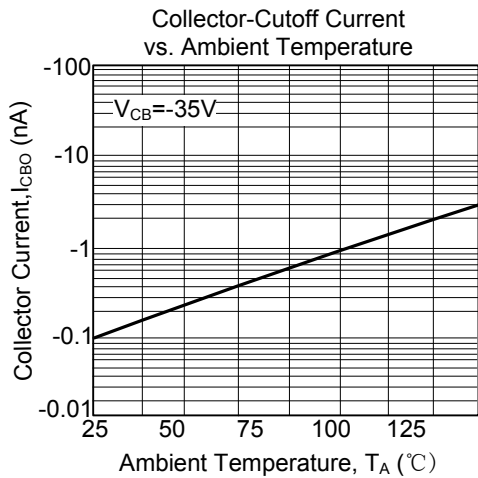
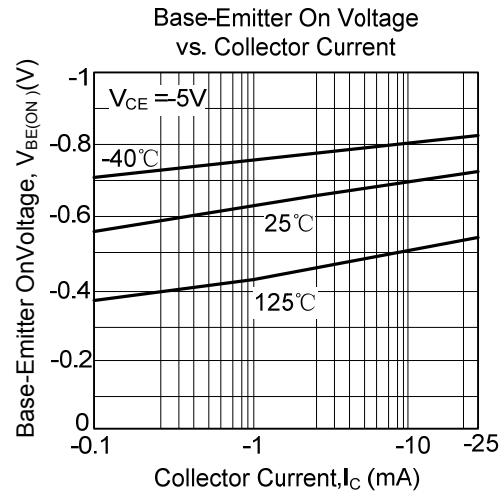
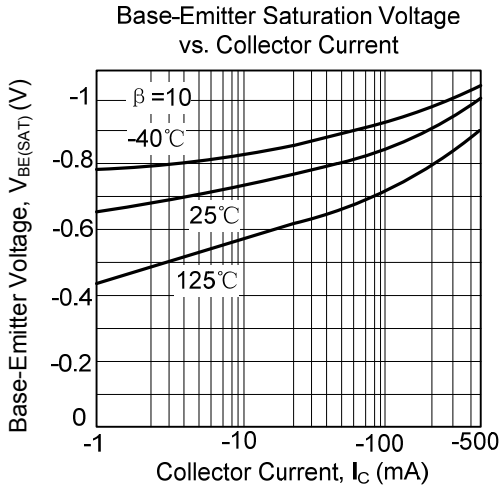
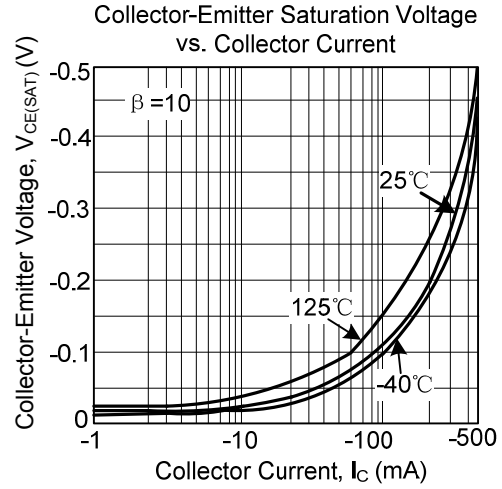
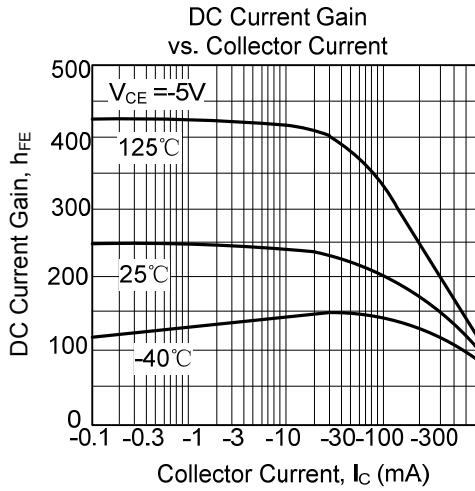


Figure 2. Saturated Turn-Off Switching Timer

TYPICAL CHARACTERISTICS



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