



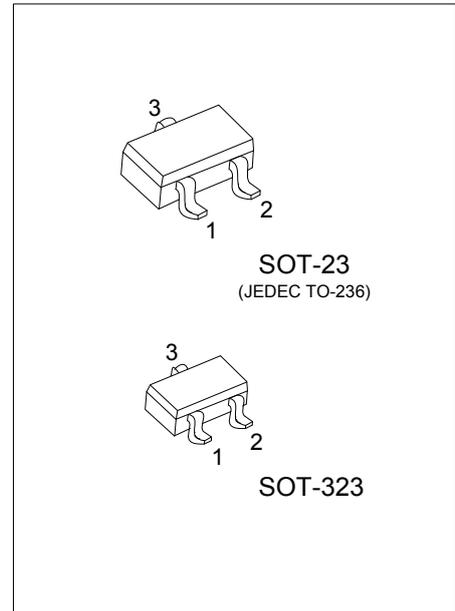
## MMBT4403

## 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.



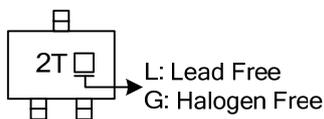
#### ORDERING INFORMATION

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

Note: Pin Assignment: B: Base E: Emitter C: Collector

<p>MMBT4403G-AE3-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) AE3: SOT-23, AL3: SOT-323</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
---	---

#### MARKING



■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , 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 $25^\circ\text{C}$		2.8	mW/ $^\circ\text{C}$
Junction Temperature	$T_J$	+150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

- Notes: 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 CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

CHARACTERISTIC	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	357	$^\circ\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

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

Note: Pulse test: Pulse Width $\leq 300\mu\text{s}$ , Duty Cycles $\leq 2\%$ .

■ TEST CIRCUIT

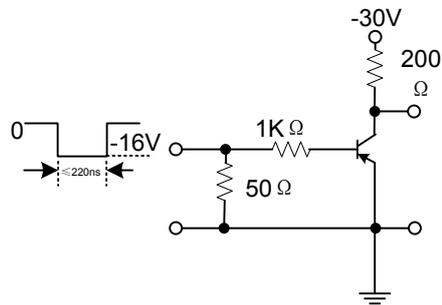


Figure 1. Saturated Turn-On Switching Timer

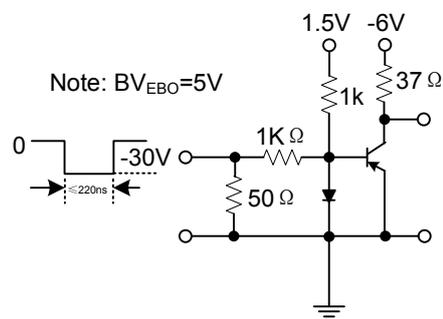
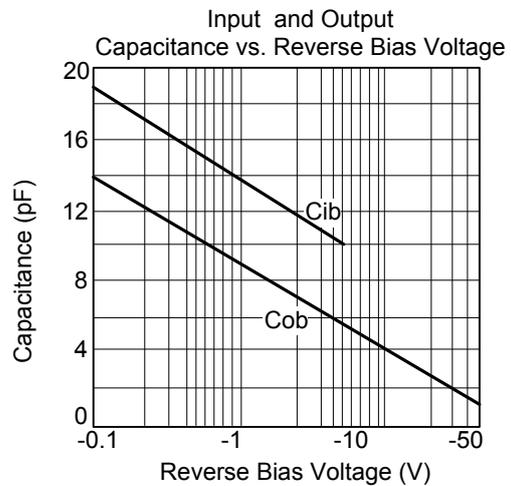
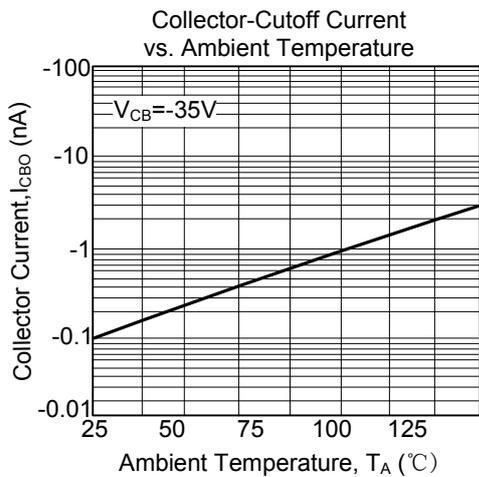
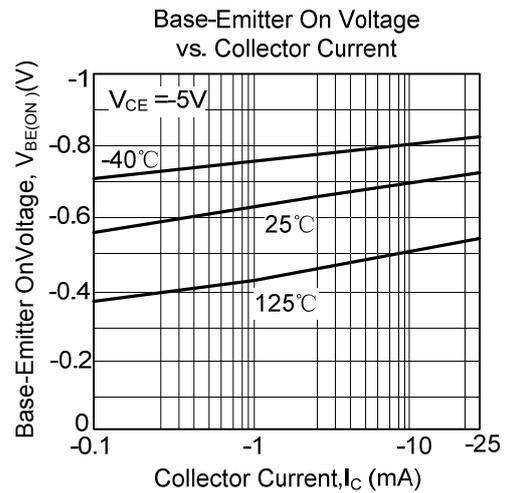
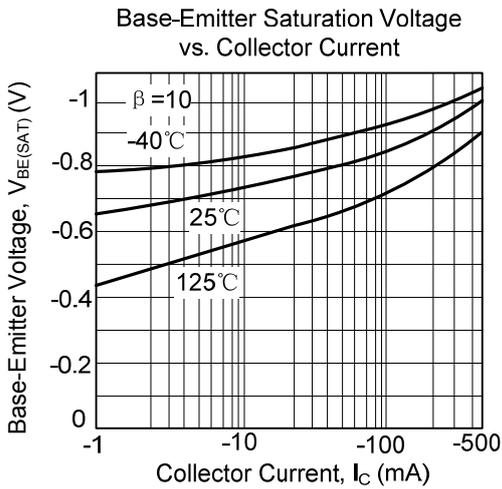
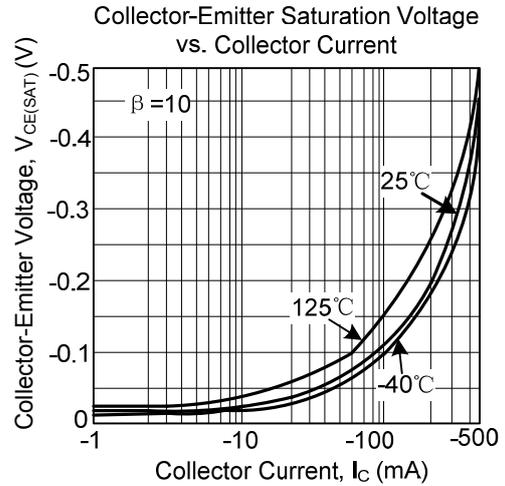
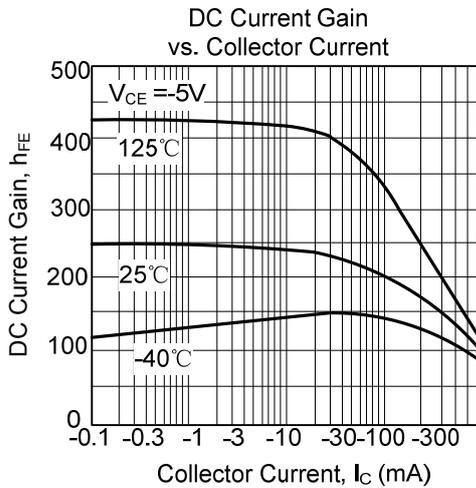


Figure 2. Saturated Turn-Off Switching Timer

### TYPICAL CHARACTERISTICS



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.