UNISONIC TECHNOLOGIES CO., LTD
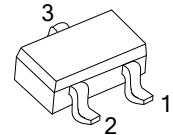
MMBT4401   *NPN SILICON TRANSISTOR*
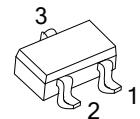
NPN GENERAL PURPOSE AMPLIFIER

■   **DESCRIPTION**

The UTC **MMBT4401** is designed for use as a medium power amplifier and switch requiring collector currents up to 500mA.

SOT-23
(JEDEC TO-236)

SOT-323
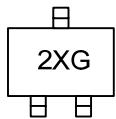
■   **ORDERING INFORMATION**

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
MMBT4401G-AE3-R	SOT-23	E	B	C	Tape Reel
MMBT4401G-AL3-R	SOT-323	E	B	C	Tape Reel

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

MMBT4401G-AE3-R

(1)Packing Type   (1) R: Tape Reel

(2)Package Type   (2) AE3: SOT-23, AL3: SOT-323

(3)Green Package   (3) G: Halogen Free and Lead Free

■   **MARKING**

2XG

MMBT4401

■ **ABSOLUTE MAXIMUM RATING** (T_A=25°C, unless otherwise specified) (Note)

PARAMETER	SYMBOL	RATINGS	UNIT
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current-Continuous	I_C	600	mA
Total Device Dissipation Derate above 25°C	P_D	350 2.8	mW mW/°C
Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	–40 ~ +150	°C

Note: 1. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

2. 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.

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

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

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

| PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	I_C=0.1mA, I_E=0	60			V
Collector-Emitter Breakdown Voltage (note)	BV_{CEO}	I_C=1mA, I_B=0	40			V
Emitter-Base Breakdown Voltage	BV_{EBO}	I_E=0.1mA, I_C=0	6			V
Collector Cut-off Current	I_{CEX}	V_{CE}=35V, V_{EB}=0.4V				μA
Base Cut-off Current	I_{BL}	V_{CE}=35V, V_{EB}=0.4V				μA
ON CHARACTERISTICS (note)						
DC Current Gain	h_{FE1}	V_{CE}=1V, I_C=0.1mA	20			
	h_{FE2}	V_{CE}=1V, I_C=1mA	40			
	h_{FE3}	V_{CE}=1V, I_C=10mA	80			
	h_{FE4}	V_{CE}=1V, I_C=150mA	100		300	
	h_{FE5}	V_{CE}=2V, I_C=500mA	40			
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	V
Base-Emitter Saturation Voltage	$V_{BE(SAT1)}$	I_C=150mA, I_B=15mA	0.75		0.95	V
	$V_{BE(SAT2)}$	I_C=500mA, I_B=50mA			1.2	V
SMALL SIGNAL CHARACTERISTICS1						
Current Gain Bandwidth Product	f_T	V_{CE}=10V, I_C=20mA, f=100MHz	250			MHz
Collector-Base Capacitance	C_{CB}	V_{CB}=5V, I_E=0, f=140kHz			6.5	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		15	kΩ
Voltage Feedback Ratio	h_{RE}	V_{CE}=10V, I_C=1mA, f=1kHz	0.1		8	×10⁻⁴
Small-Signal Current Gain	h_{FE}	V_{CE}=10V, I_C=1mA, f=1kHz	40		500	
Output Admittance	h_{OE}	V_{CE}=10V, I_C=1mA, f=1kHz	1		30	μmhos
SWITCHING CHARACTERISTICS						
Delay Time	t_D	V_{CC}=30V, V_{EB}=2V, I_C=150mA I_{B1}=15mA			15	ns
Rise Time	t_R	V_{CC}=30V, V_{EB}=2V, I_C=150mA I_{B1}=15mA			20	ns
Storage Time	t_S				225	ns
Fall Time	t_F	V_{CC}=30V, I_C=150mA I_{B1}=I_{B2}=15mA			30	ns

Note: Pulse test: PulseWidth≤300μs, Duty Cycle≤2%

■ **TEST CIRCUIT**
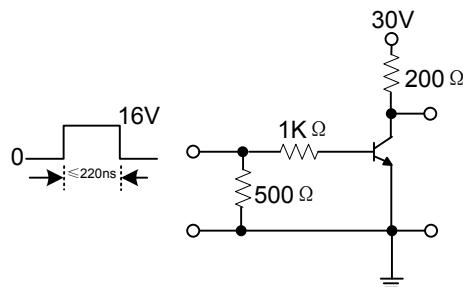
Figure1. Saturated Turn-On Switching Timer
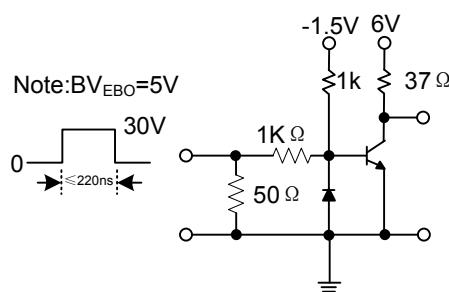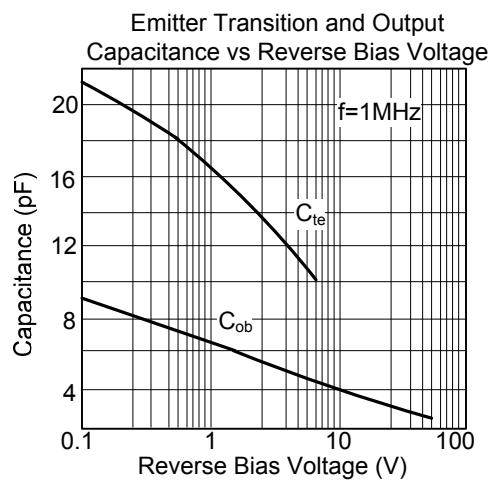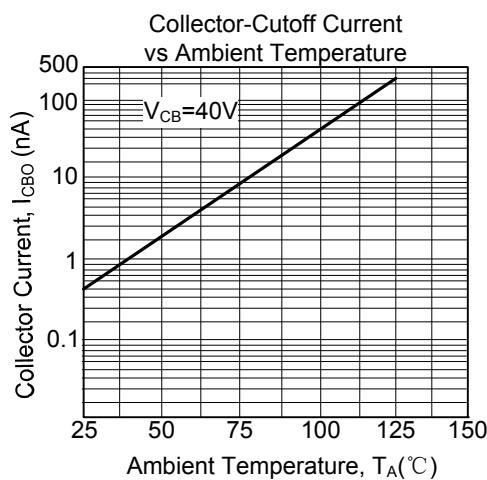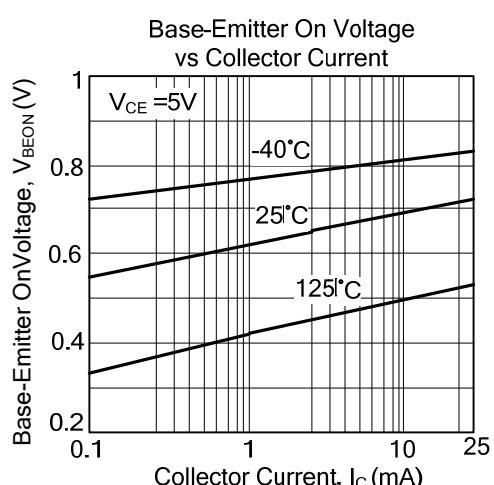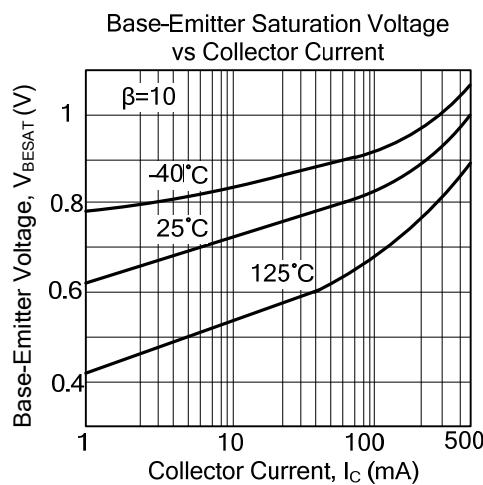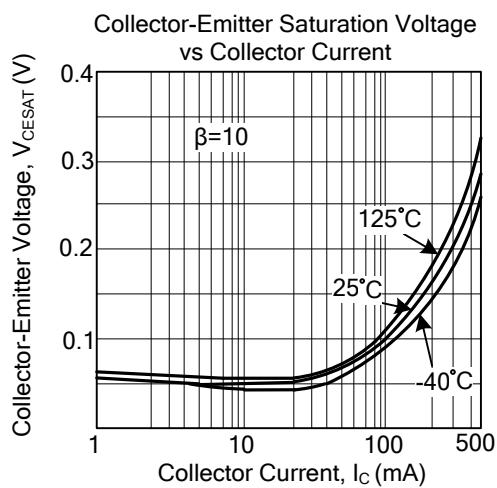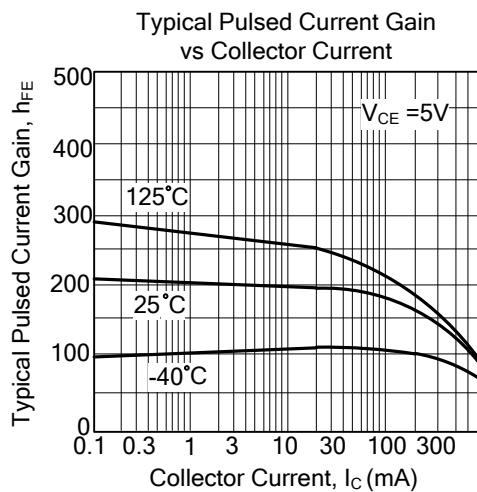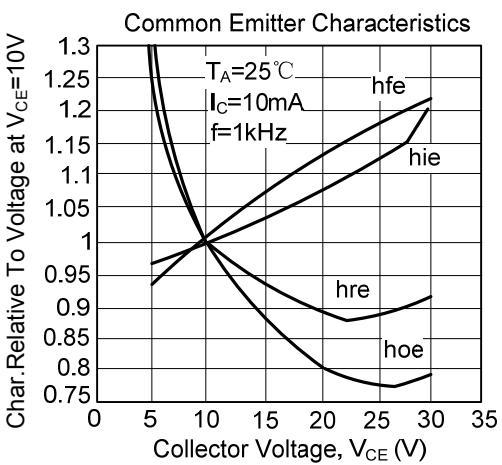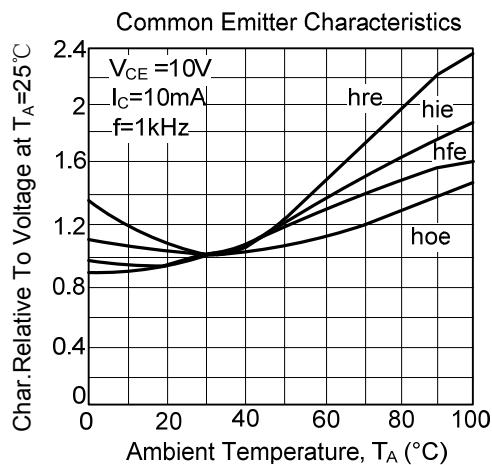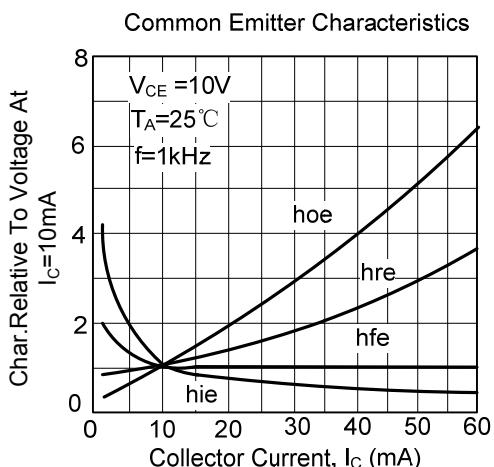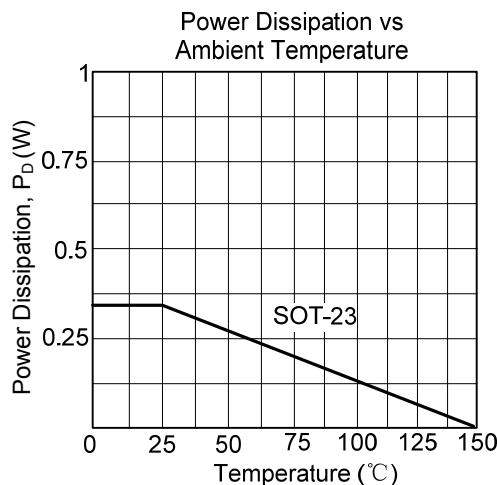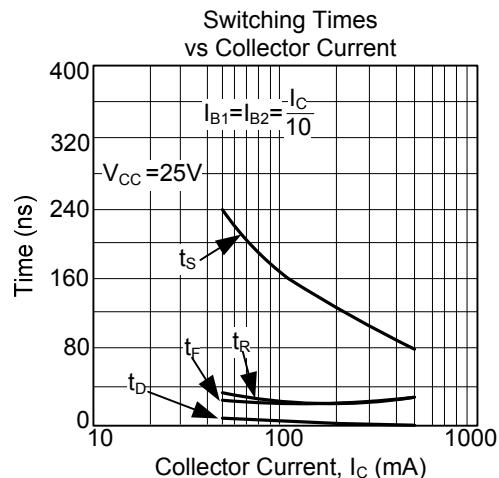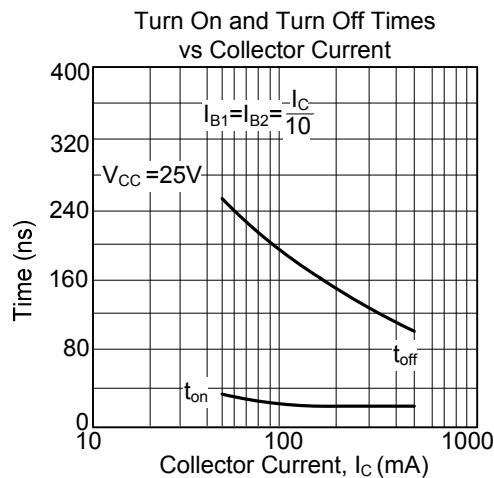
Figure2. Saturated Turn-Off Switching Timer
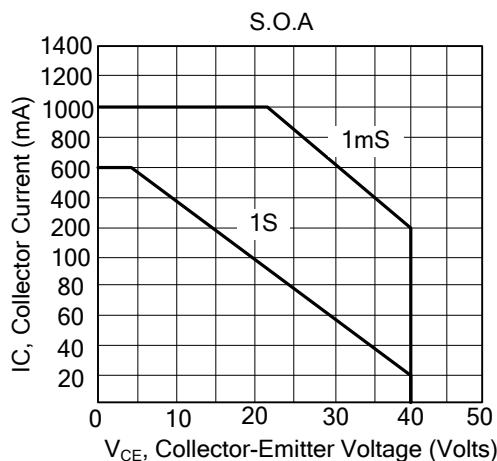
■ **TYPICAL CHARACTERISTICS**

Typical Pulsed Current Gain vs Collector Current

Collector-Emitter Saturation Voltage vs Collector Current

Base-Emitter Saturation Voltage vs Collector Current

Base-Emitter On Voltage vs Collector Current

Collector-Cutoff Current vs Ambient Temperature

Emitter Transition and Output Capacitance vs Reverse Bias Voltage

■ **TYPICAL CHARACTERISTICS(Cont.)**

Turn On and Turn Off Times
vs Collector Current

$I_{B1}=I_{B2}=\dfrac{I_C}{10}$

$V_{CC}=25V$

t_{off}

t_{on}

Collector Current, I_C (mA)

Time (ns)

Switching Times
vs Collector Current

$I_{B1}=I_{B2}=\dfrac{I_C}{10}$

$V_{CC}=25V$

t_S

t_F t_R

t_D

Collector Current, I_C (mA)

Time (ns)

Power Dissipation vs
Ambient Temperature

SOT-23

Power Dissipation, P_D (W)

Temperature (℃)

Common Emitter Characteristics

$V_{CE}=10V$
$T_A=25℃$
f=1kHz

hoe

hre

hfe

hie

Char.Relative To Voltage At I_C=10mA

Collector Current, I_C (mA)

Common Emitter Characteristics

$V_{CE}=10V$
$I_C=10mA$
f=1kHz

hre hie

hfe

hoe

Char.Relative To Voltage at T_A=25℃

Ambient Temperature, T_A (°C)

Common Emitter Characteristics

$T_A=25℃$
$I_C=10mA$
f=1kHz

hfe

hie

hre

hoe

Char.Relative To Voltage at V_{CE}=10V

Collector Voltage, V_{CE} (V)

■ **TYPICAL CHARACTERISTICS(Cont.)**

S.O.A

IC, Collector Current (mA) vs V_{CE}, Collector-Emitter Voltage (Volts)

1mS

1S

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Bipolar Transistors - BJT *category:*

Click to view products by Unisonic *manufacturer:*

Other Similar products are found below :

619691C MCH4017-TL-H MMBT-2369-TR BC546/116 BC557/116 BSW67A NJVMJD148T4G NTE123AP-10 NTE153MCP NTE16 NTE195A NTE92 C4460 2N4401-A 2N6728 2SA1419T-TD-H 2SA2126-E 2SB1204S-TL-E 2SC2712S-GR,LF 2SC5488A-TL-H 2SD2150T100R SP000011176 2N2907A 2N3904-NS 2N5769 2SC2412KT146S 2SD1816S-TL-E CPH6501-TL-E MCH4021-TL-E MJE340 US6T6TR NJL0281DG 732314D CPH3121-TL-E CPH6021-TL-H 873787E IMZ2AT108 UMX21NTR MCH6102-TL-E NJL0302DG 2N3583 30A02MH-TL-E NSV40301MZ4T1G NTE13 NTE26 NTE282 NTE323 NTE350 NTE81 STX83003-AP