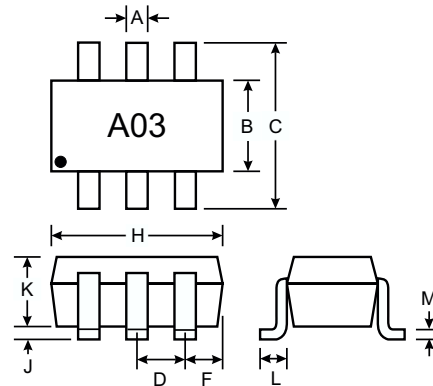
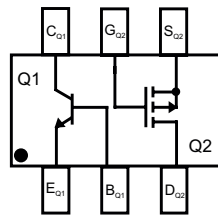


Features

- Combines MMBT4401 type transistor with BSS84 type MOSFET
- Small Surface Mount Package
- PNP/N-Channel Complement Available: CTA2P1N

Mechanical Data

- Case: SOT-363, Molded Plastic
Terminals: Solderable per MIL-STD-202, Method 208
- Case material - UL Flammability Rating Classification 94V-0
- Terminal Connections: See Diagram
- Marking: A03
- Weight: 0.006 grams (approx.)



SOT-363		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Nominal	
F	0.30	0.40
H	1.80	2.20
J	—	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.25
All Dimensions in mm		

Maximum Ratings, Total Device @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 1)	P_d	150	mW
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	833	$^\circ\text{C/W}$
Operating and Storage and Temperature Range	T_j, T_{STG}	-55 to +150	$^\circ\text{C}$

Maximum Ratings, Q1, NPN MMBT4401 NPN Transistor Element @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6.0	V
Collector Current - Continuous	I_C	600	mA

Maximum Ratings, Q2, BSS84 P-Channel MOSFET Element @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V_{DSS}	-50	V
Drain-Gate Voltage $R_{GS} \leq 1.0\text{M}\Omega$	V_{DGR}	-50	V
Gate-Source Voltage	Continuous V_{GSS}	± 20	V
Drain Current	Continuous I_D	-130	mA

Electrical Characteristics, Q1, MMBT4401 NPN Transistor Element

@ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 2)					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	60	—	V	$I_C = 100\mu\text{A}$, $I_E = 0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	40	—	V	$I_C = 1.0\text{mA}$, $I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6.0	—	V	$I_E = 100\mu\text{A}$, $I_C = 0$
Collector Cutoff Current	I_{CEX}	—	100	nA	$V_{CE} = 35\text{V}$, $V_{EB(OFF)} = 0.4\text{V}$
Base Cutoff Current	I_{BL}	—	100	nA	$V_{CE} = 35\text{V}$, $V_{EB(OFF)} = 0.4\text{V}$
ON CHARACTERISTICS (Note 2)					
DC Current Gain	h_{FE}	20 40 80 100 40	— — — 300 —	—	$I_C = 100\mu\text{A}$, $V_{CE} = 1.0\text{V}$ $I_C = 1.0\text{mA}$, $V_{CE} = 1.0\text{V}$ $I_C = 10\text{mA}$, $V_{CE} = 1.0\text{V}$ $I_C = 150\text{mA}$, $V_{CE} = 1.0\text{V}$ $I_C = 500\text{mA}$, $V_{CE} = 2.0\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	0.40 0.75	V	$I_C = 150\text{mA}$, $I_B = 15\text{mA}$ $I_C = 500\text{mA}$, $I_B = 50\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	0.75 —	0.95 1.2	V	$I_C = 150\text{mA}$, $I_B = 15\text{mA}$ $I_C = 500\text{mA}$, $I_B = 50\text{mA}$
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{cb}	—	6.5	pF	$V_{CB} = 5.0\text{V}$, $f = 1.0\text{MHz}$, $I_E = 0$
Input Capacitance	C_{eb}	—	30	pF	$V_{EB} = 0.5\text{V}$, $f = 1.0\text{MHz}$, $I_C = 0$
Input Impedance	h_{ie}	1.0	15	k Ω	$V_{CE} = 10\text{V}$, $I_C = 1.0\text{mA}$, $f = 1.0\text{kHz}$
Voltage Feedback Ratio	h_{re}	0.1	8.0	$\times 10^{-4}$	
Small Signal Current Gain	h_{fe}	40	500	—	
Output Admittance	h_{oe}	1.0	30	μS	
Current Gain-Bandwidth Product	f_T	250	—	MHz	$V_{CE} = 10\text{V}$, $I_C = 20\text{mA}$, $f = 100\text{MHz}$
SWITCHING CHARACTERISTICS					
Delay Time	t_d	—	15	ns	$V_{CC} = 30\text{V}$, $I_C = 150\text{mA}$, $V_{BE(off)} = 2.0\text{V}$, $I_{B1} = 15\text{mA}$
Rise Time	t_r	—	20	ns	
Storage Time	t_s	—	225	ns	$V_{CC} = 30\text{V}$, $I_C = 150\text{mA}$, $I_{B1} = I_{B2} = 15\text{mA}$
Fall Time	t_f	—	30	ns	

Electrical Characteristics, Q2, BSS84 P-Channel MOSFET Element

@ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 2)						
Drain-Source Breakdown Voltage	BV_{DSS}	-50	—	—	V	$V_{GS} = 0\text{V}$, $I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-15 -60 -100	μA μA nA	$V_{DS} = -50\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 25^\circ\text{C}$ $V_{DS} = -50\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 125^\circ\text{C}$ $V_{DS} = -25\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 25^\circ\text{C}$
Gate-Body Leakage	I_{GSS}	—	—	± 10	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.8	—	-2.0	V	$V_{DS} = V_{GS}$, $I_D = -1\text{mA}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	10	Ω	$V_{GS} = -5\text{V}$, $I_D = 0.100\text{A}$
Forward Transconductance	g_{FS}	.05	—	—	S	$V_{DS} = -25\text{V}$, $I_D = 0.1\text{A}$
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{iss}	—	—	45	pF	$V_{DS} = -25\text{V}$, $V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	—	25	pF	
Reverse Transfer Capacitance	C_{rss}	—	—	12	pF	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	—	10	—	ns	$V_{DD} = -30\text{V}$, $I_D = -0.27\text{A}$, $R_{GEN} = 50\Omega$, $V_{GS} = -10\text{V}$
Turn-Off Delay Time	$t_{D(OFF)}$	—	18	—	ns	

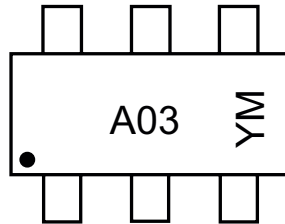
- Notes: 1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
2. Short duration pulse test used to minimize self-heating effect.

Ordering Information (Note 3)

Device	Packaging	Shipping
CTA2N1P-7	SOT-363	3000/Tape & Reel

Notes: 3. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information



A03 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year ex: N = 2002
 M = Month ex: 9 = September

Date Code Key

Year	1998	1999	2000	2001	2002	2003	2004
Code	J	K	L	M	N	O	P

Month	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

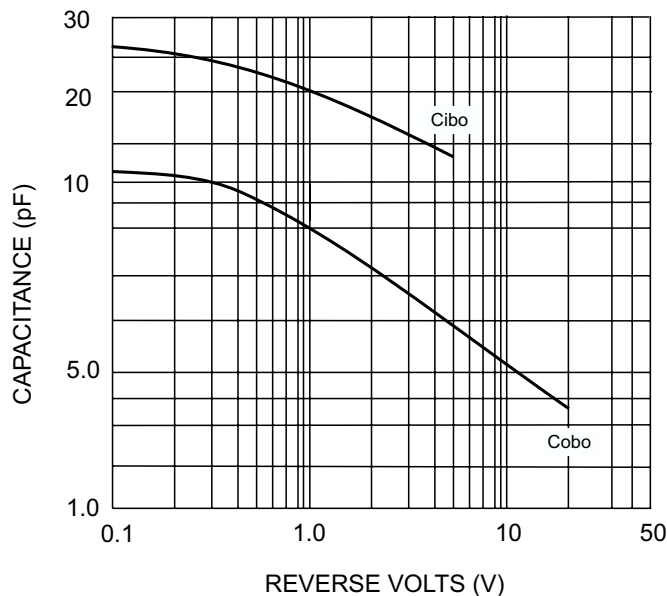


Fig. 1 Typical Capacitance (MMBT4401)

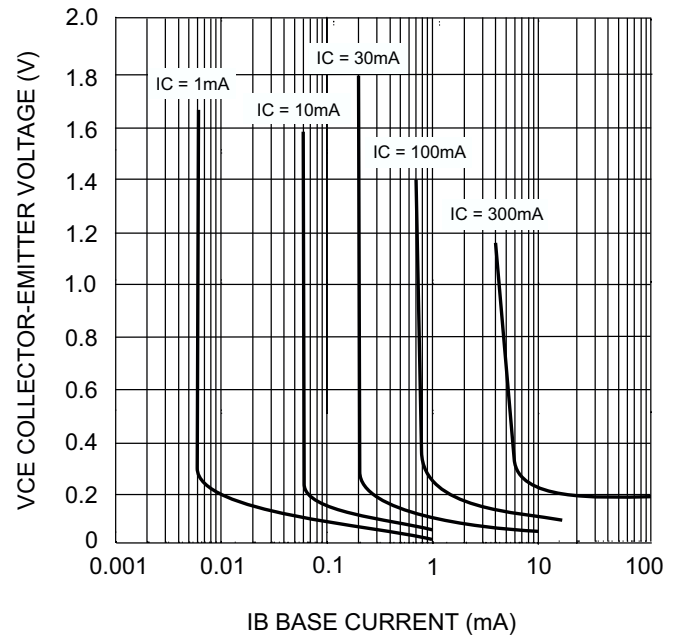


Fig. 2 Typical Collector Saturation Region (MMBT4401)