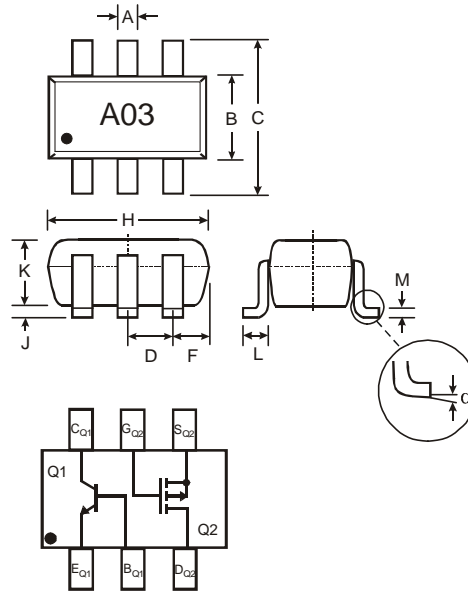


Features

- Combines MMBT4401 type transistor with BSS84 type MOSFET
- Small Surface Mount Package
- PNP/N-Channel Complement Available: CTA2P1N
- **Lead Free/RoHS Compliant (Note 2)**
- **"Green" Device (Note 3 and 4)**

Mechanical Data

- Case: SOT-363
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Marking Information: A03, See Page 6
- Ordering Information: See Page 6
- Weight: 0.006 grams (approximate)



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
α	0°	8°
All Dimensions in mm		

Maximum Ratings, Total Device @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 1)	P _d	150	mW
Thermal Resistance, Junction to Ambient (Note 1)	R _{θJA}	833	°C/W
Operating and Storage Temperature Range	T _j , T _{STG}	-55 to +150	°C

Maximum Ratings, Q1, MMBT4401 NPN Transistor Element @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	60	V
Collector-Emitter Voltage	V _{CE0}	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°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	-50	V
Drain-Gate Voltage R _{GS} ≤ 1.0MΩ	V _{DGR}	-50	V
Gate-Source Voltage Continuous	V _{GSS}	±20	V
Drain Current Continuous	I _D	-130	mA

- 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. No purposefully added lead.
 3. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
 4. Product manufactured with Date Code UO (week 40, 2007) and newer are built with Green Molding Compound. Product manufactured prior to Date Code UO are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.

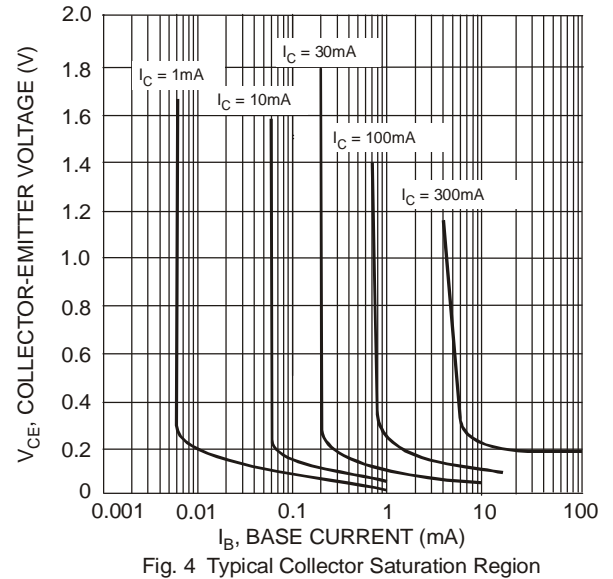
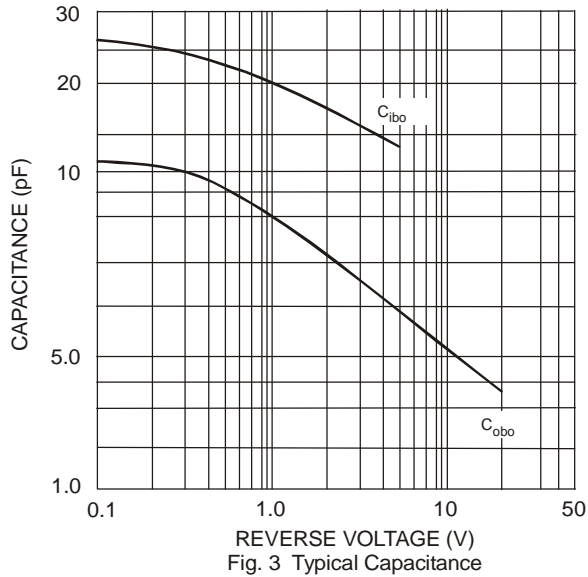
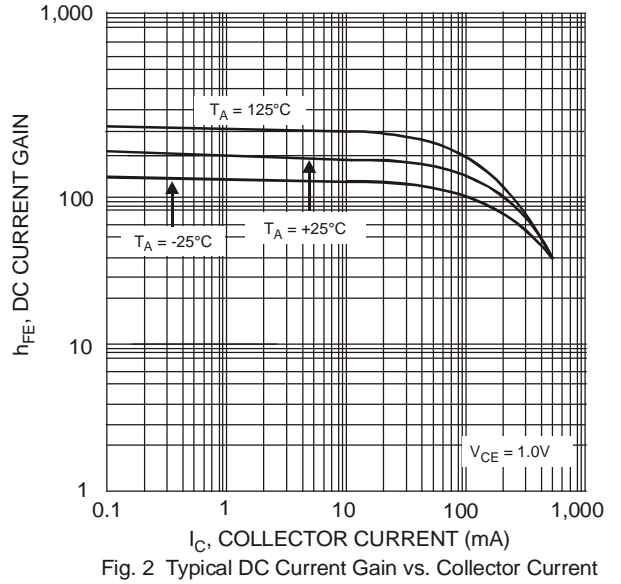
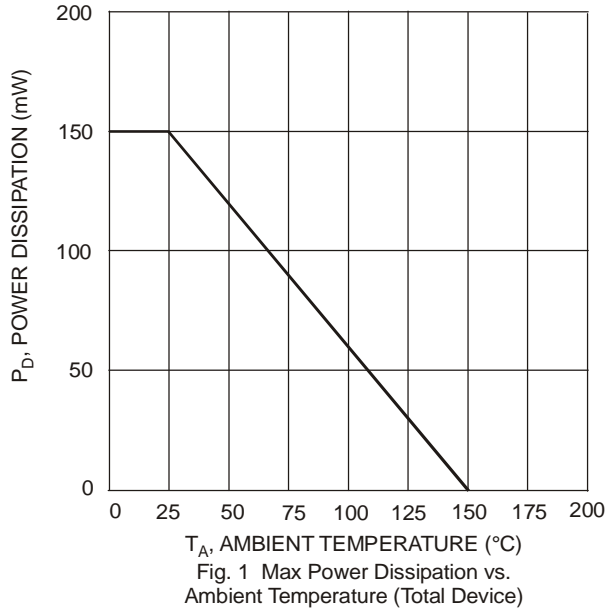
Electrical Characteristics, Q1, MMBT4401 NPN Transistor Element @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 5)						
Collector-Base Breakdown Voltage	V _{(BR)CBO}	60	—	V	I _C = 100μA, I _E = 0	
Collector-Emitter Breakdown Voltage	V _{(BR)CEO}	40	—	V	I _C = 1.0mA, I _B = 0	
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	6.0	—	V	I _E = 100μA, I _C = 0	
Collector Cutoff Current	I _{CEX}	—	100	nA	V _{CE} = 35V, V _{EB(OFF)} = 0.4V	
Base Cutoff Current	I _{BL}	—	100	nA	V _{CE} = 35V, V _{EB(OFF)} = 0.4V	
ON CHARACTERISTICS (Note 5)						
DC Current Gain	h _{FE}	20	—	—	I _C = 100μA, V _{CE} = 1.0V	
		40	—			I _C = 1.0mA, V _{CE} = 1.0V
		80	—			I _C = 10mA, V _{CE} = 1.0V
		100	300			I _C = 150mA, V _{CE} = 1.0V
		40	—			I _C = 500mA, V _{CE} = 2.0V
Collector-Emitter Saturation Voltage	V _{CE(SAT)}	—	0.40 0.75	V	I _C = 150mA, I _B = 15mA I _C = 500mA, I _B = 50mA	
Base-Emitter Saturation Voltage	V _{BE(SAT)}	0.75 —	0.95 1.2	V	I _C = 150mA, I _B = 15mA I _C = 500mA, I _B = 50mA	
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C _{cb}	—	6.5	pF	V _{CB} = 5.0V, f = 1.0MHz, I _E = 0	
Input Capacitance	C _{eb}	—	30	pF	V _{EB} = 0.5V, f = 1.0MHz, I _C = 0	
Input Impedance	h _{ie}	1.0	15	kΩ	V _{CE} = 10V, I _C = 1.0mA, f = 1.0kHz	
Voltage Feedback Ratio	h _{re}	0.1	8.0	x 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} = 10V, I _C = 20mA, f = 100MHz
SWITCHING CHARACTERISTICS						
Delay Time	t _d	—	15	ns	V _{CC} = 30V, I _C = 150mA,	
Rise Time	t _r	—	20	ns	V _{BE(off)} = 2.0V, I _{B1} = 15mA	
Storage Time	t _s	—	225	ns	V _{CC} = 30V, I _C = 150mA, I _{B1} = I _{B2} = 15mA	
Fall Time	t _f	—	30	ns		

Electrical Characteristics, Q2, BSS84 P-Channel MOSFET Element @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 5)						
Drain-Source Breakdown Voltage	BV _{DSS}	-50	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-15	μA	V _{DS} = -50V, V _{GS} = 0V, T _J = 25°C
		—	—	-60	μA	V _{DS} = -50V, V _{GS} = 0V, T _J = 125°C
		—	—	-100	nA	V _{DS} = -25V, V _{GS} = 0V, T _J = 25°C
Gate-Body Leakage	I _{GSS}	—	—	±10	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 5)						
Gate Threshold Voltage	V _{GS(th)}	-0.8	—	-2.0	V	V _{DS} = V _{GS} , I _D = -1mA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	—	10	Ω	V _{GS} = -5V, I _D = 0.100A
Forward Transconductance	g _{FS}	.05	—	—	S	V _{DS} = -25V, I _D = 0.1A
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iSS}	—	—	45	pF	V _{DS} = -25V, V _{GS} = 0V f = 1.0MHz
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} = -30V, I _D = -0.27A,
Turn-Off Delay Time	t _{D(OFF)}	—	18	—	ns	R _{GEN} = 50Ω, V _{GS} = -10V

Notes: 5. Short duration pulse test used to minimize self-heating effect.



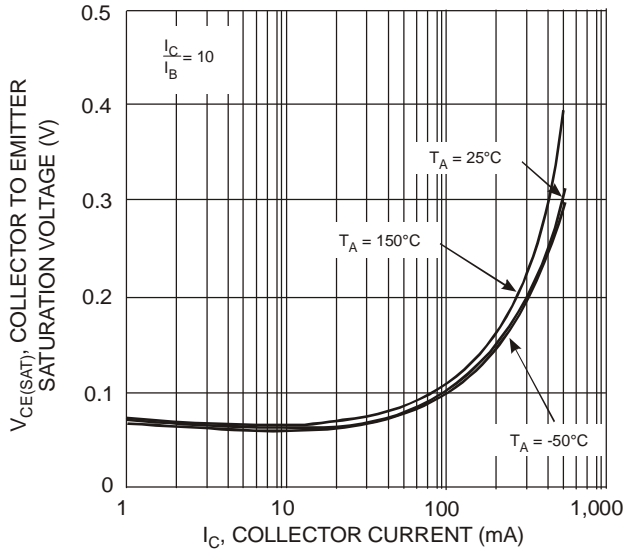


Fig. 5 Collector Emitter Saturation Voltage vs. Collector Current

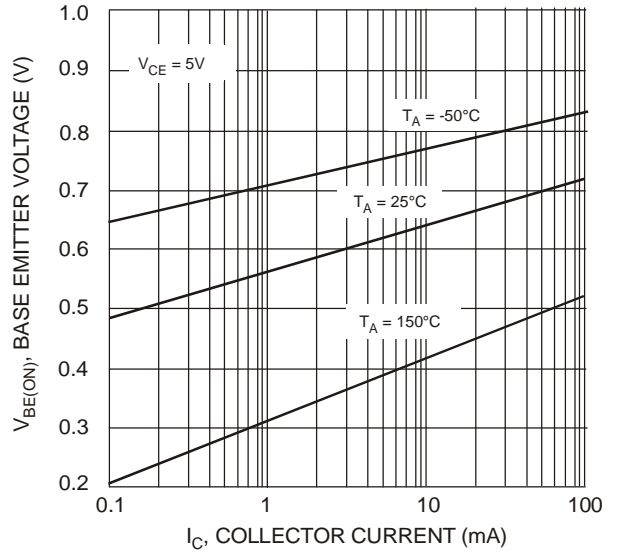


Fig. 6 Base Emitter Voltage vs. Collector Current

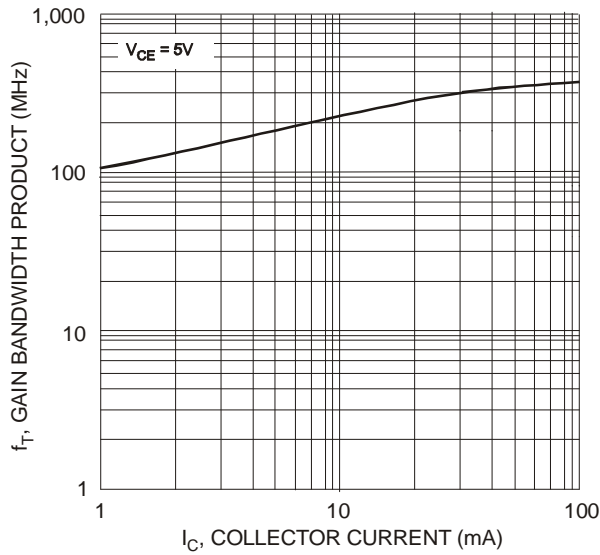
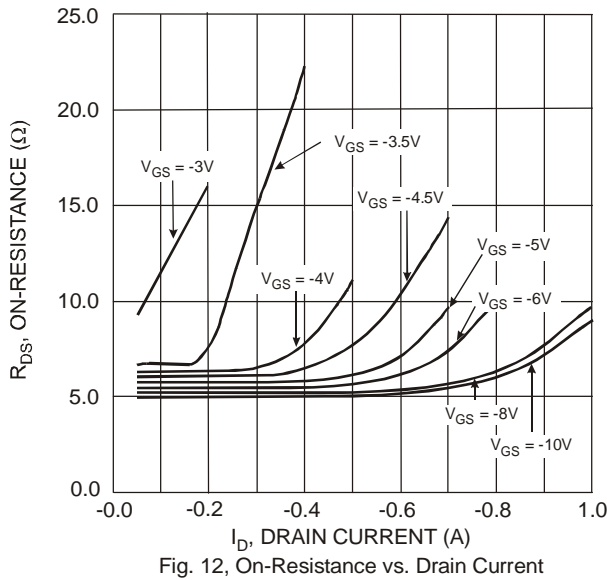
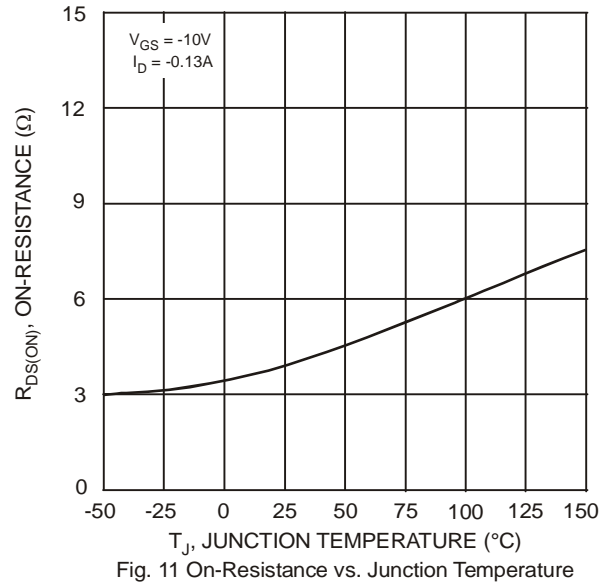
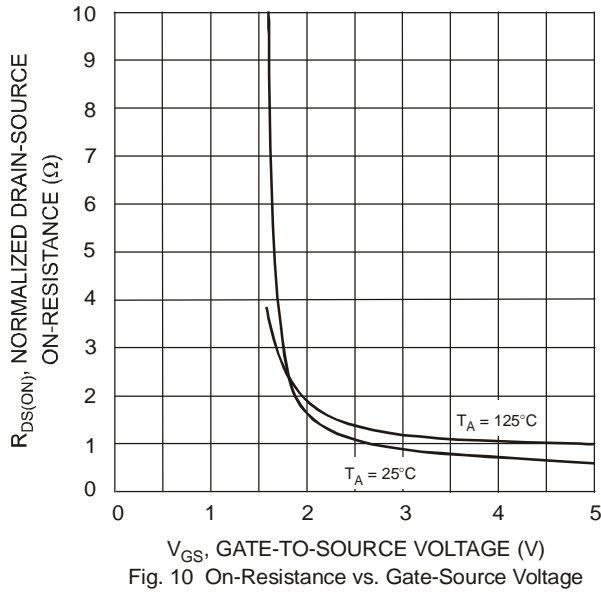
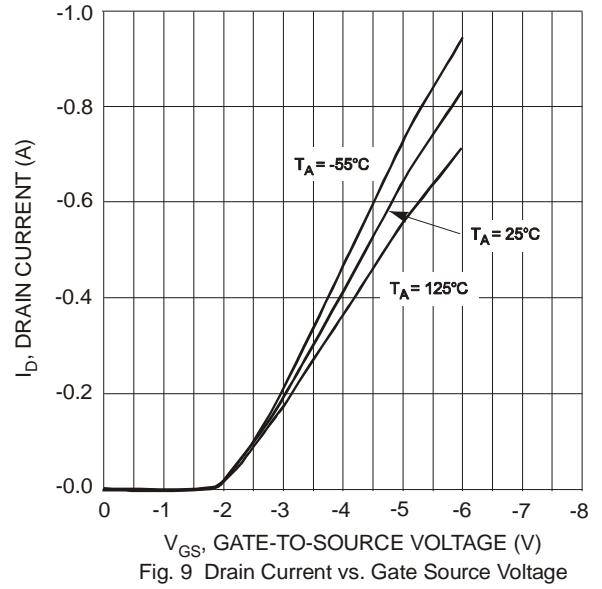
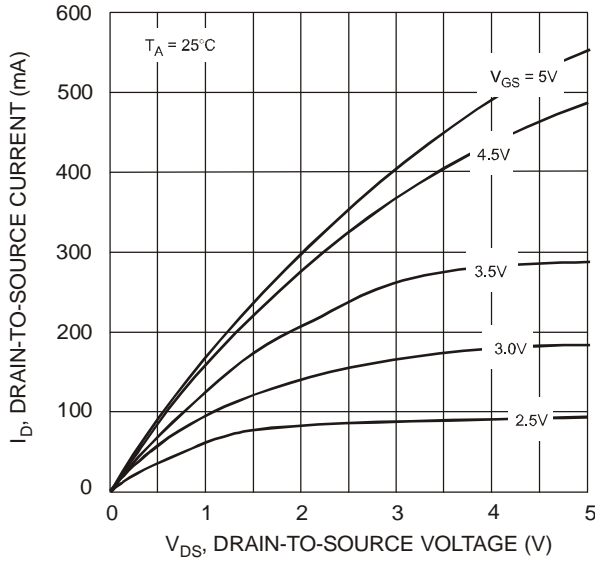


Fig. 7 Gain Bandwidth Product vs. Collector Current

NEW PRODUCT

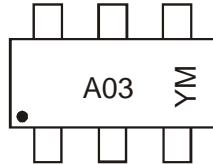


Ordering Information (Note 6)

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

Notes: 6. 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: T = 2006
 M = Month ex: 9 = September

Date Code Key

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Code	M	N	P	R	S	T	U	V	W	X	Y	Z

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

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