CTA2P1N

COMPLEX TRANSISTOR ARRAY

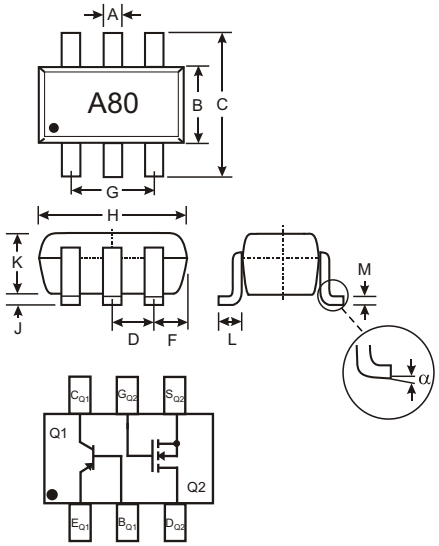
NEW PRODUCT

Features

- Combines MMBT4403 type transistor with 2N7002 type MOSFET
- Small Surface Mount Package
- NPN/P-Channel Complement Available: CTA2N1P
- **Lead Free/RoHS Compliant (Note 1)**

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: A80, See Page 3
- Ordering Information: See Page 3
- 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
	0	8°
All Dimensions in mm		

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 2)	P_d	150	mW
Thermal Resistance, Junction to Ambient (Note 2)	R_{JA}	833	C/W
Operating and Storage and Temperature Range	T_j, T_{STG}	-55 to +150	C

Maximum Ratings, Q1, MMBT4403 PNP Transistor Element @ T_A = 25 C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-5.0	V
Collector Current - Continuous	I_C	-600	mA

Maximum Ratings, Q2, 2N7002 N-Channel MOSFET Element @ T_A = 25 C unless otherwise specified

Characteristic		Symbol	Value	Units
Drain-Source Voltage		V_{DSS}	60	V
Drain-Gate Voltage R_{GS} 1.0M		V_{DGR}	60	V
Gate-Source Voltage	Continuous Pulsed	V_{GSS}	±20 ±40	V
Drain Current (Note 2)	Continuous Continuous @ 100°C Pulsed	I_D	115 73 800	mA

Notes: 1. No purposefully added lead.

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Electrical Characteristics, Q1, MMBT4403 PNP Transistor Element

@ T_A = 25 C unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 3)					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-40		V	I_C = -100 A, I_E = 0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-40		V	I_C = -1.0mA, I_B = 0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5.0		V	I_E = -100 A, 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 3)					
DC Current Gain	h_{FE}	30 60 100 100 20	300		I_C = -100µA, V_{CE} = -1.0V I_C = -1.0mA, V_{CE} = -1.0V I_C = -10mA, V_{CE} = -1.0V I_C = -150mA, V_{CE} = -2.0V 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 -1.30	V	I_C = -150mA, I_B = -15mA I_C = -500mA, I_B = -50mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{cb}		8.5	pF	V_{CB} = -10V, 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}	1.5	15	k	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}	60	500		
Output Admittance	h_{oe}	1.0	100	S	
Current Gain-Bandwidth Product	f_T	200		MHz	V_{CE} = -10V, I_C = -20mA, f = 100MHz
SWITCHING CHARACTERISTICS					
Delay Time	t_d		15	ns	V_{CC} = -30V, I_C = -150mA, $V_{BE(off)}$ = -2.0V, I_{B1} = -15mA
Rise Time	t_r		20	ns	
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, 2N7002 N-Channel MOSFET Element

@ T_A = 25 C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 3)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	70		V	V_{GS} = 0V, I_D = 10 A
Zero Gate Voltage Drain Current @ T_C = 25°C @ T_C = 125°C	I_{DSS}			1.0 500	µA	V_{DS} = 60V, V_{GS} = 0V
Gate-Body Leakage	I_{GSS}			±10	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	1.0		2.0	V	V_{DS} = V_{GS}, I_D =-250 A
Static Drain-Source On-Resistance @ T_j = 25°C @ T_j = 125°C	$R_{DS\ (ON)}$		3.2 4.4	7.5 13.5		V_{GS} = 5.0V, I_D = 0.05A V_{GS} = 10V, I_D = 0.5A
On-State Drain Current	$I_{D(ON)}$	0.5	1.0		A	V_{GS} = 10V, V_{DS} = 7.5V
Forward Transconductance	g_{FS}	80			mS	V_{DS} =10V, I_D = 0.2A
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{iss}		22	50	pF	V_{DS} = 25V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}		11	25	pF	
Reverse Transfer Capacitance	C_{rss}		2.0	5.0	pF	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$		7.0	20	ns	V_{DD} = 30V, I_D = 0.2A, R_L = 150 , V_{GEN} = 10V, R_{GEN} = 25
Turn-Off Delay Time	$t_{D(OFF)}$		11	20	ns	

Note: 2. Device mounted on FR-4 PCB; 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.

3. Short test pulse used to minimize self-heating effect.

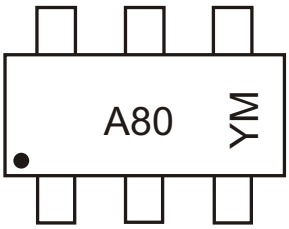
NEW PRODUCT

Ordering Information (Note 4)

Device	Packaging	Shipping
CTA2P1N-7-F	SOT-363	3000/Tape & Reel

Notes: 4. For Packaging Details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

Marking Information



A80 = Product Type Marking Code
YM = Date Code Marking
Y = Year ex: N = 2002
M = Month ex: 9 = September

Date Code Key

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Code	M	N	P	R	S	T	U	V	W

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

MMBT4403 Section

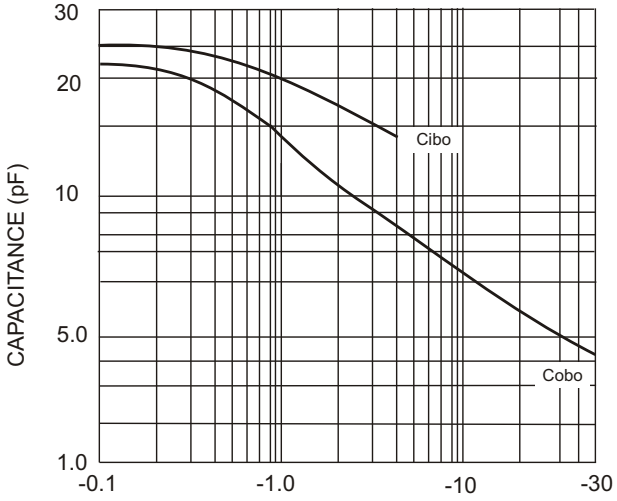


Fig. 1 Typical Capacitance

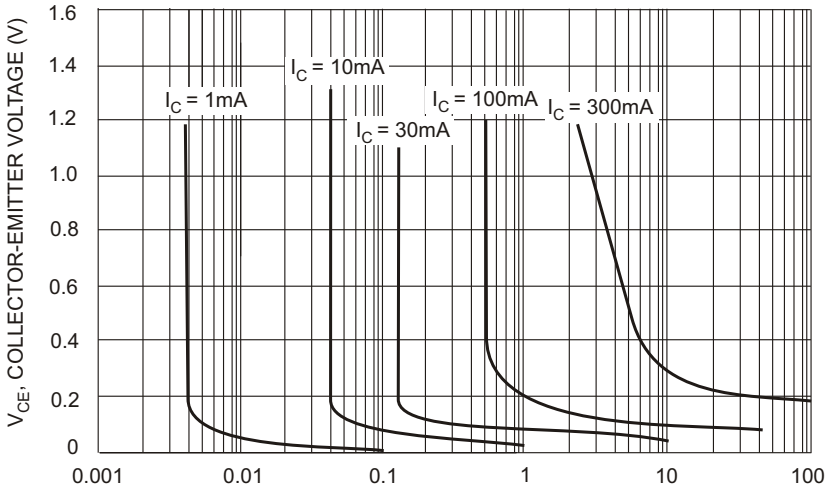


Fig. 2 Typical Collector Saturation Region

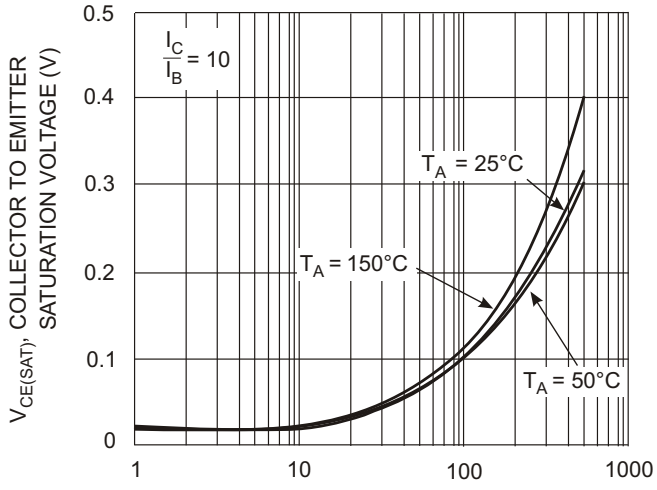


Fig. 3 Collector Emitter Saturation Voltage vs. Collector Current

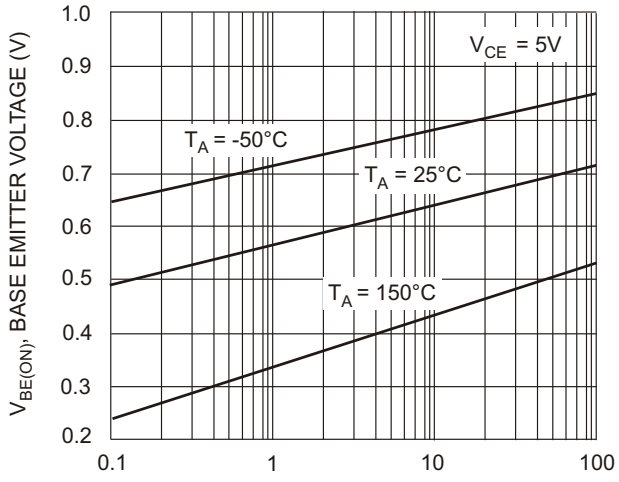


Fig. 4 Base-Emitter Voltage vs. Collector Current

MMBT4403 Section

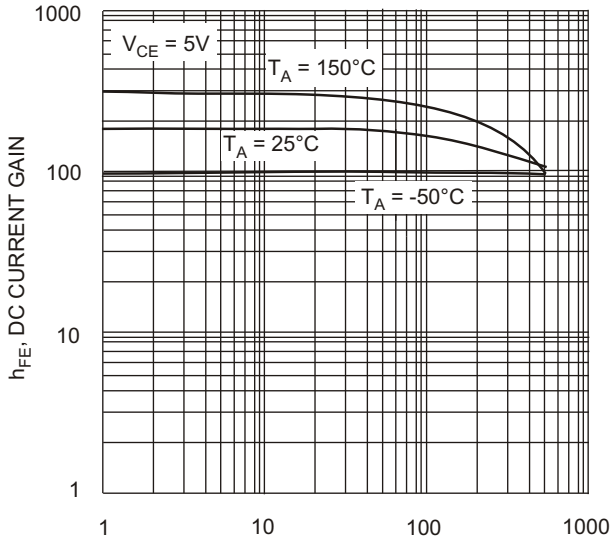


Fig. 5 DC Current Gain vs. Collector Current

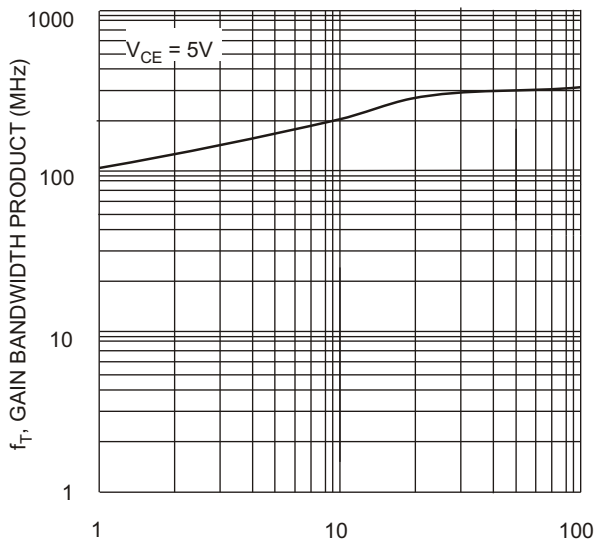


Fig. 6 Gain Bandwidth Product vs. Collector Current

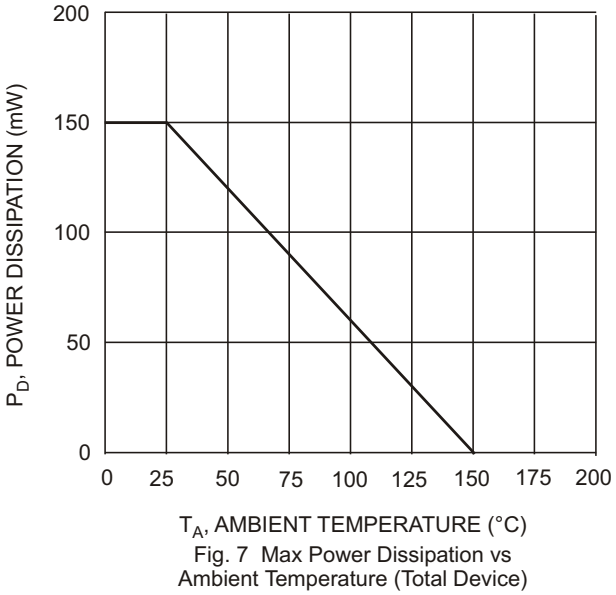


Fig. 7 Max Power Dissipation vs Ambient Temperature (Total Device)

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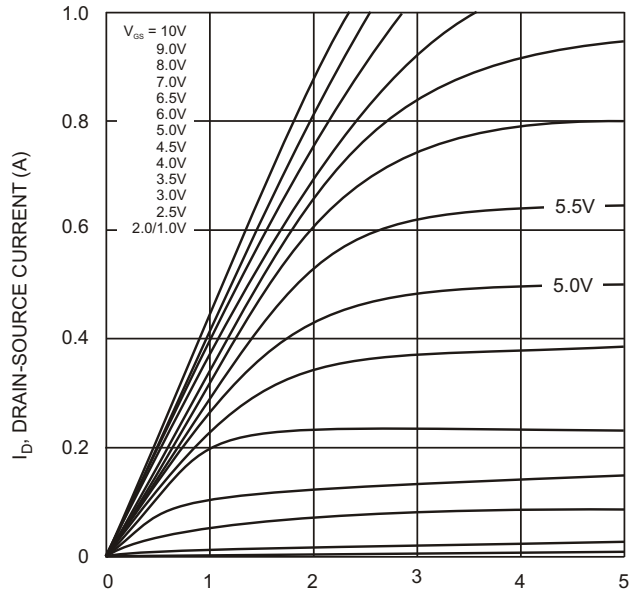

Fig. 8 On-Region Characteristics (2N7002)

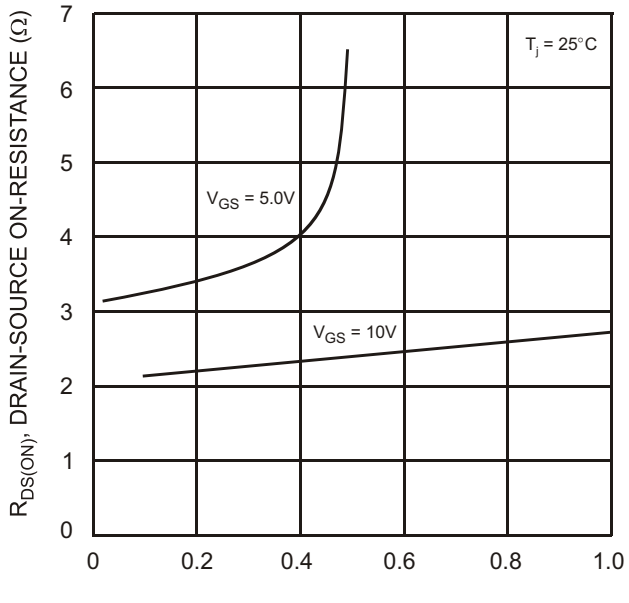

Fig. 9 On-Resistance vs Drain Current (2N7002)

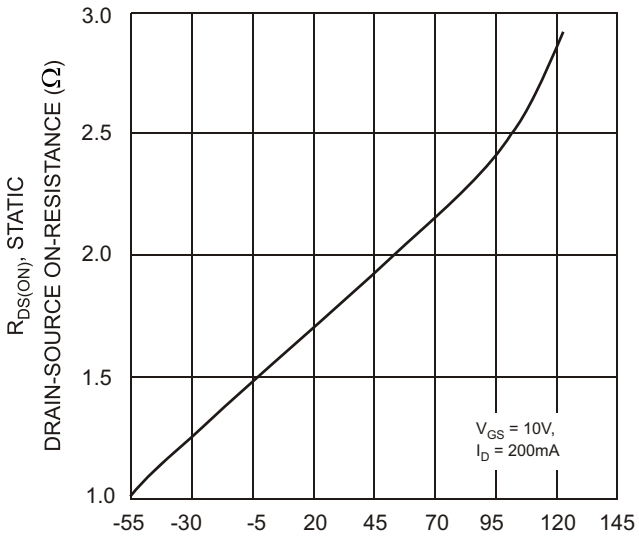

Fig. 10 On-Resistance vs Junction Temperature (2N7002)

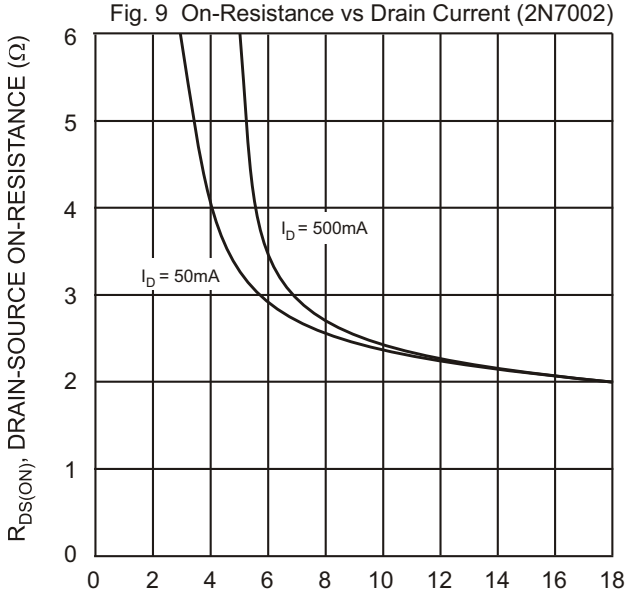

Fig. 11 On-Resistance vs. Gate-Source Voltage (2N7002)

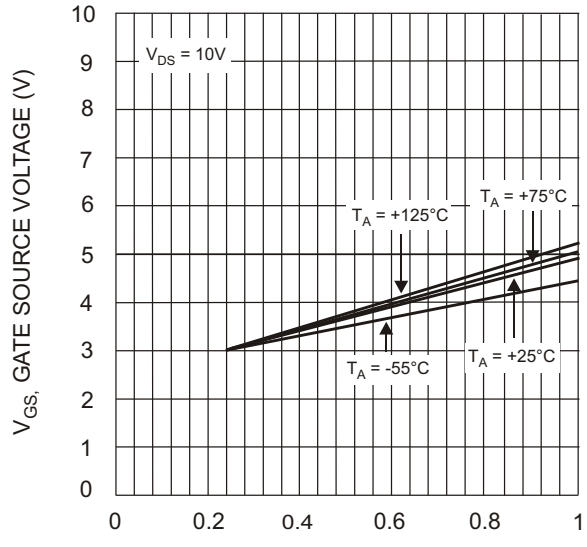

Fig. 12 Typical Transfer Characteristics (2N7002)

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