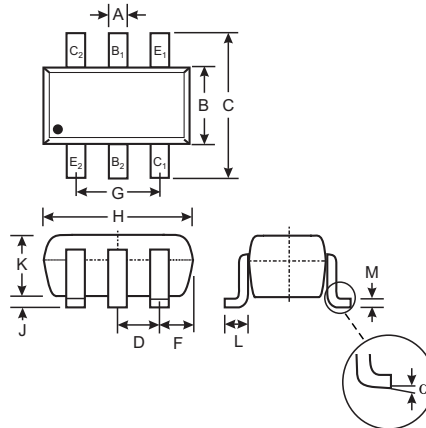


COMPLEMENTARY NPN / PNP SMALL SIGNAL SURFACE MOUNT TRANSISTOR

Features

- Complementary Pair
- Epitaxial Planar Die Construction
- Ultra-Small Surface Mount Package
- One 2222A Type (NPN),
One 2907A Type (PNP)
- Ideal for Low Power Amplification and Switching
- **Lead Free/RoHS Compliant (Note 2)**

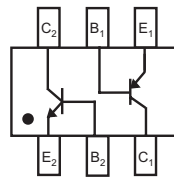


SOT-363		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Nominal	
F	0.30	0.40
H	1.80	2.20
J	—	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.25
α	8°	
All Dimensions in mm		

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
- Ordering & Date Code Information: See Page 4
- Marking (See Page 3): K27
- Weight: 0.006 grams (approximate)

Note: E1, B1, and C1 = 2907A Type (PNP)
E2, B2, and C2 = 2222A Type (NPN)
Type marking indicates orientation.



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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 1)	P_d	200	mW
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	625	$^\circ\text{C}/\text{W}$
Operating and Storage and Temperature Range	T_j, T_{STG}	-55 to +150	$^\circ\text{C}$

Maximum Ratings, 2222A Type (NPN) @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	NPN2222A	Unit
Collector-Base Voltage	V_{CBO}	75	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, 2907A Type (PNP) @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	PNP2907A	Unit
Collector-Base Voltage	V_{CBO}	-60	V
Collector-Emitter Voltage	V_{CEO}	-60	V
Emitter-Base Voltage	V_{EBO}	-5.0	V
Collector Current - Continuous	I_C	-600	mA

- Note:
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.

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 3)					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	75	—	V	$I_C = 10\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	40	—	V	$I_C = 10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6.0	—	V	$I_E = 10\mu\text{A}, I_C = 0$
Collector Cutoff Current	I_{CBO}	—	10	nA μA	$V_{CB} = 60\text{V}, I_E = 0$ $V_{CB} = 60\text{V}, I_E = 0, T_A = 150^\circ\text{C}$
Collector Cutoff Current	I_{CEX}	—	10	nA	$V_{CE} = 60\text{V}, V_{EB(OFF)} = 3.0\text{V}$
Emitter Cutoff Current	I_{EBO}	—	10	nA	$V_{EB} = 3.0\text{V}, I_C = 0$
Base Cutoff Current	I_{BL}	—	20	nA	$V_{CE} = 60\text{V}, V_{EB(OFF)} = 3.0\text{V}$
ON CHARACTERISTICS (Note 3)					
DC Current Gain	h_{FE}	35	—	—	$I_C = 100\mu\text{A}, V_{CE} = 10\text{V}$ $I_C = 1.0\text{mA}, V_{CE} = 10\text{V}$ $I_C = 10\text{mA}, V_{CE} = 10\text{V}$ $I_C = 150\text{mA}, V_{CE} = 10\text{V}$ $I_C = 500\text{mA}, V_{CE} = 10\text{V}$ $I_C = 10\text{mA}, V_{CE} = 10\text{V}, T_A = -55^\circ\text{C}$ $I_C = 150\text{mA}, V_{CE} = 1.0\text{V}$
		50	—		
		75	—		
		100	300		
		40	—		
		50	—		
35	—				
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	0.3 1.0	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	$V_{BE(SAT)}$	0.6 —	1.2 2.0	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_{obo}	—	8	pF	$V_{CB} = 10\text{V}, f = 1.0\text{MHz}, I_E = 0$
Input Capacitance	C_{ibo}	—	25	pF	$V_{EB} = 0.5\text{V}, f = 1.0\text{MHz}, I_C = 0$
Current Gain-Bandwidth Product	f_T	300	—	MHz	$V_{CE} = 20\text{V}, I_C = 20\text{mA}, f = 100\text{MHz}$
Noise Figure	NF	—	4.0	dB	$V_{CE} = 10\text{V}, I_C = 100\mu\text{A}, R_S = 1.0\text{k}\Omega, f = 1.0\text{kHz}$
SWITCHING CHARACTERISTICS					
Delay Time	t_d	—	10	ns	$V_{CC} = 30\text{V}, I_C = 150\text{mA}, V_{BE(off)} = -0.5\text{V}, I_{B1} = 15\text{mA}$
Rise Time	t_r	—	25	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	—	60	ns	

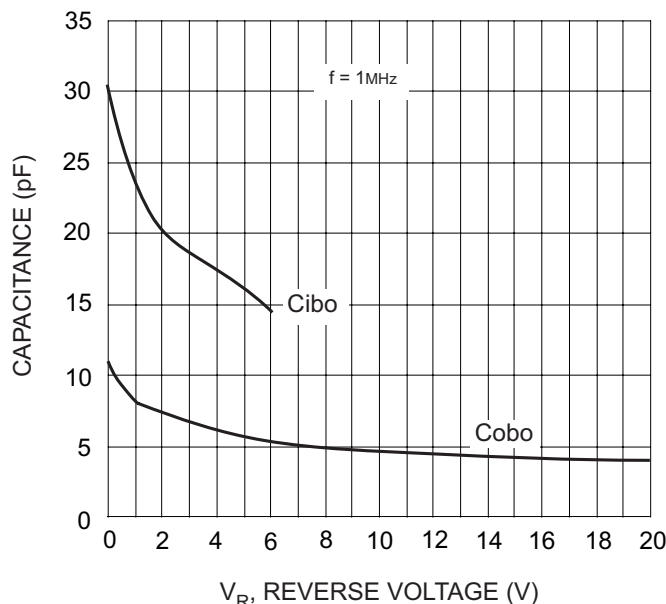
 Note: 3. Pulse test: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.


Fig. 1, Typical Capacitance Characteristics (2222A Type - NPN)

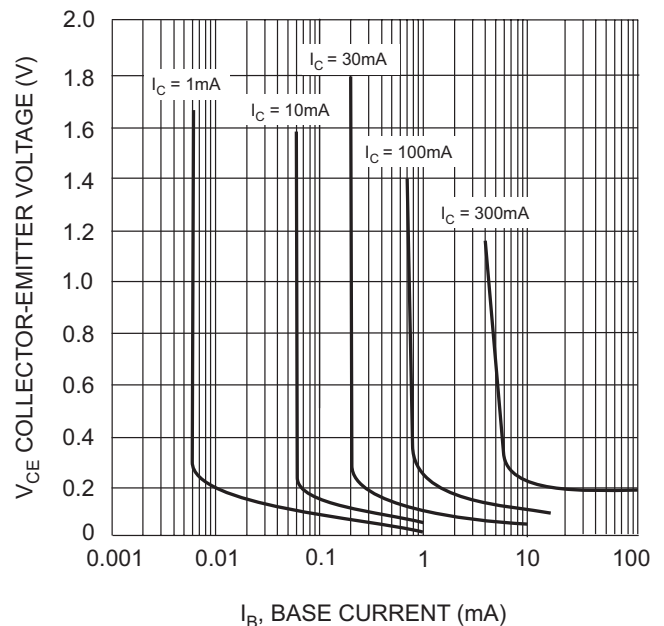


Fig. 2, Typical Collector Saturation Region (2222A Type - NPN)

Electrical Characteristics, 2907A Type (PNP)

@ T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 4)					
Collector-Base Breakdown Voltage	V _{(BR)CBO}	-60	—	V	I _C = -10μA, I _E = 0
Collector-Emitter Breakdown Voltage	V _{(BR)CEO}	-60	—	V	I _C = -10mA, I _B = 0
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	-5.0	—	V	I _E = -10μA, I _C = 0
Collector Cutoff Current	I _{CBO}	—	-10	nA μA	V _{CB} = -50V, I _E = 0 V _{CB} = -50V, I _E = 0, T _A = 125°C
Collector Cutoff Current	I _{CEX}	—	-50	nA	V _{CE} = -30V, V _{EB(OFF)} = -0.5V
Base Cutoff Current	I _{BL}	—	-50	nA	V _{CE} = -30V, V _{EB(OFF)} = -0.5V
ON CHARACTERISTICS (Note 4)					
DC Current Gain	h _{FE}	75 100 100 100 50	— — — 300 —	—	I _C = -100μA, V _{CE} = -10V I _C = -1.0mA, V _{CE} = -10V I _C = -10mA, V _{CE} = -10V I _C = -150mA, V _{CE} = -10V I _C = -500mA, V _{CE} = -10V
Collector-Emitter Saturation Voltage	V _{CE(SAT)}	—	-0.4 -1.6	V	I _C = -150mA, I _B = -15mA I _C = -500mA, I _B = -50mA
Base-Emitter Saturation Voltage	V _{BE(SAT)}	—	-1.3 -2.6	V	I _C = 150mA, I _B = 15mA I _C = 500mA, I _B = 50mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C _{obo}	—	8.0	pF	V _{CB} = -10V, f = 1.0MHz, I _E = 0
Input Capacitance	C _{ibo}	—	30	pF	V _{EB} = -2.0V, f = 1.0MHz, I _C = 0
Current Gain-Bandwidth Product	f _T	200	—	MHz	V _{CE} = -20V, I _C = -50mA, f = 100MHz
SWITCHING CHARACTERISTICS					
Turn-On Time	t _{off}	—	45	ns	
Delay Time	t _d	—	10	ns	V _{CC} = -30V, I _C = -150mA, I _{B1} = -15mA
Rise Time	t _r	—	40	ns	
Turn-Off Time	t _{off}	—	100	ns	
Storage Time	t _s	—	80	ns	V _{CC} = -6.0V, I _C = -150mA, I _{B1} = I _{B2} = -15mA
Fall Time	t _f	—	30	ns	

Note: 4. Short duration test pulse used to minimize self-heating effect.

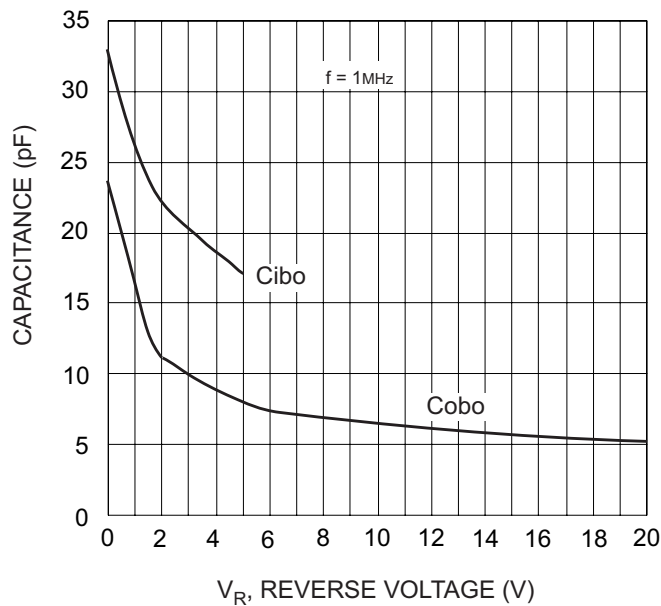


Fig. 3, Typical Capacitance Characteristics (2907A Type - PNP)

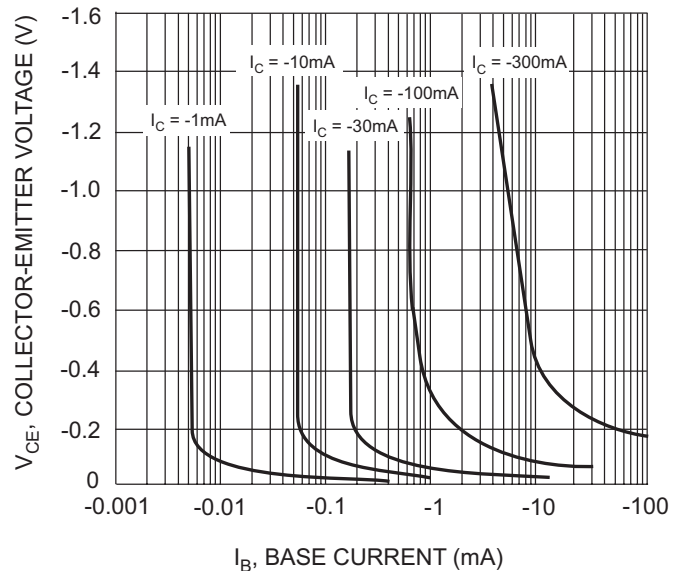


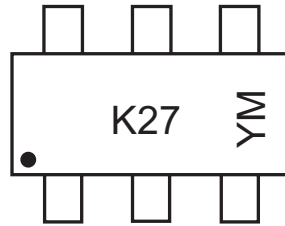
Fig. 4, Typical Collector Saturation Region (2907A Type - PNP)

Ordering Information (Note 5)

Device	Packaging	Shipping
MMDT2227-7-F	SOT-363	3000/Tape & Reel

Note: 5. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information



K27 = 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	2005	2006	2007	2008	2009
Code	J	K	L	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

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