

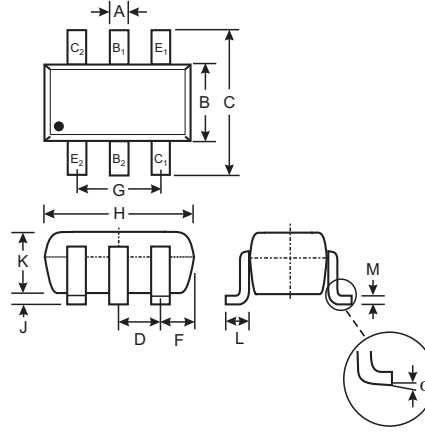
COMPLEMENTARY NPN / PNP SMALL SIGNAL SURFACE MOUNT TRANSISTOR

Features

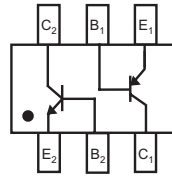
- Complementary Pair
- Epitaxial Planar Die Construction
- Ultra-Small Surface Mount Package
- One 2222A Type (NPN),
One 2907A Type (PNP)
- Ideal for Low Power Amplification and Switching
- **Lead Free/RoHS Compliant (Note 2)**

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.



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		

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

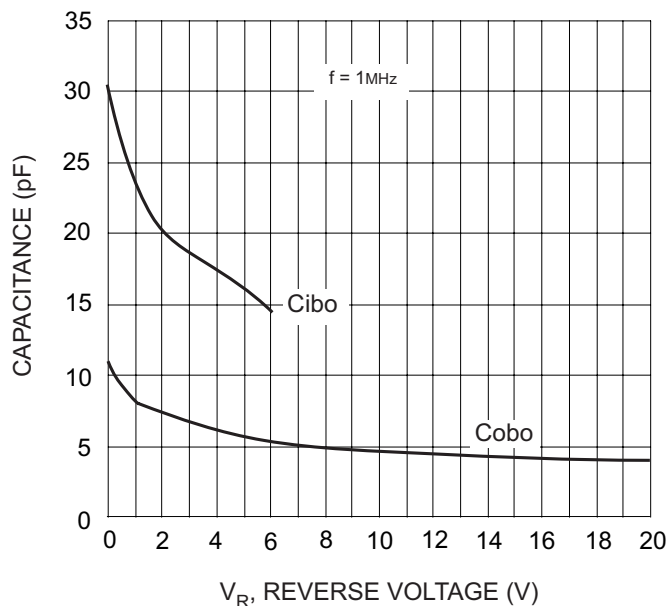
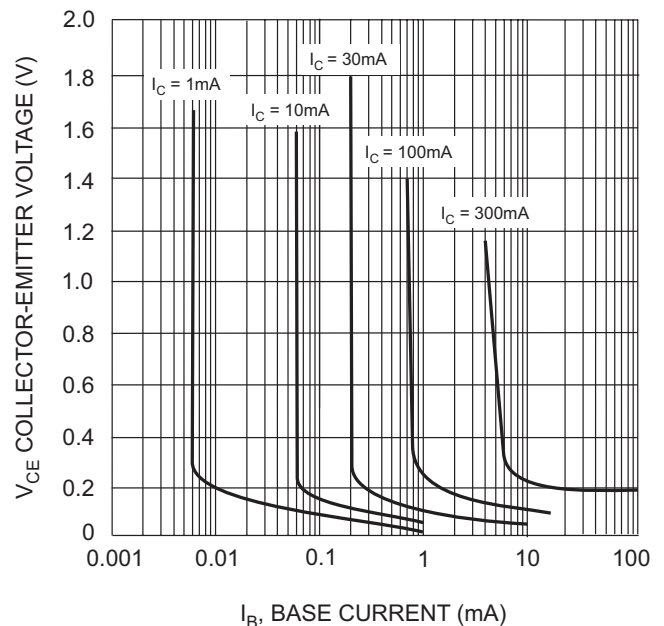
- Note:
1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
 2. No purposefully added lead.

Electrical Characteristics, 2222A Type (NPN)

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

[查询"MMDT2227"供应商](#)

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 50 75 100 40 50 35	— — — 300 — — —	—	$I_C = 100\mu\text{A}$, $V_{CE} = 10\text{V}$ $I_C = 1.0\text{mA}$, $V_{CE} = 10\text{V}$ $I_C = 10\text{mA}$, $V_{CE} = 10\text{V}$ $I_C = 150\text{mA}$, $V_{CE} = 10\text{V}$ $I_C = 500\text{mA}$, $V_{CE} = 10\text{V}$ $I_C = 10\text{mA}$, $V_{CE} = 10\text{V}$, $T_A = -55^\circ\text{C}$ $I_C = 150\text{mA}$, $V_{CE} = 1.0\text{V}$
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)

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

查询"MMDT2227" 11供应商

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 4)					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-60	—	V	$I_C = -10\mu\text{A}$, $I_E = 0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-60	—	V	$I_C = -10\text{mA}$, $I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5.0	—	V	$I_E = -10\mu\text{A}$, $I_C = 0$
Collector Cutoff Current	I_{CBO}	—	-10	nA μA	$V_{CB} = -50\text{V}$, $I_E = 0$ $V_{CB} = -50\text{V}$, $I_E = 0$, $T_A = 125^\circ\text{C}$
Collector Cutoff Current	I_{CEX}	—	-50	nA	$V_{CE} = -30\text{V}$, $V_{EB(OFF)} = -0.5\text{V}$
Base Cutoff Current	I_{BL}	—	-50	nA	$V_{CE} = -30\text{V}$, $V_{EB(OFF)} = -0.5\text{V}$
ON CHARACTERISTICS (Note 4)					
DC Current Gain	h_{FE}	75 100 100 100 50	— — — 300 —	—	$I_C = -100\mu\text{A}$, $V_{CE} = -10\text{V}$ $I_C = -1.0\text{mA}$, $V_{CE} = -10\text{V}$ $I_C = -10\text{mA}$, $V_{CE} = -10\text{V}$ $I_C = -150\text{mA}$, $V_{CE} = -10\text{V}$ $I_C = -500\text{mA}$, $V_{CE} = -10\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	-0.4 -1.6	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	$V_{BE(SAT)}$	—	-1.3 -2.6	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}	—	8.0	pF	$V_{CB} = -10\text{V}$, $f = 1.0\text{MHz}$, $I_E = 0$
Input Capacitance	C_{ibo}	—	30	pF	$V_{EB} = -2.0\text{V}$, $f = 1.0\text{MHz}$, $I_C = 0$
Current Gain-Bandwidth Product	f_T	200	—	MHz	$V_{CE} = -20\text{V}$, $I_C = -50\text{mA}$, $f = 100\text{MHz}$
SWITCHING CHARACTERISTICS					
Turn-On Time	t_{off}	—	45	ns	
Delay Time	t_d	—	10	ns	$V_{CC} = -30\text{V}$, $I_C = -150\text{mA}$, $I_{B1} = -15\text{mA}$
Rise Time	t_r	—	40	ns	
Turn-Off Time	t_{off}	—	100	ns	
Storage Time	t_s	—	80	ns	$V_{CC} = -6.0\text{V}$, $I_C = -150\text{mA}$, $I_{B1} = I_{B2} = -15\text{mA}$
Fall Time	t_f	—	30	ns	

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

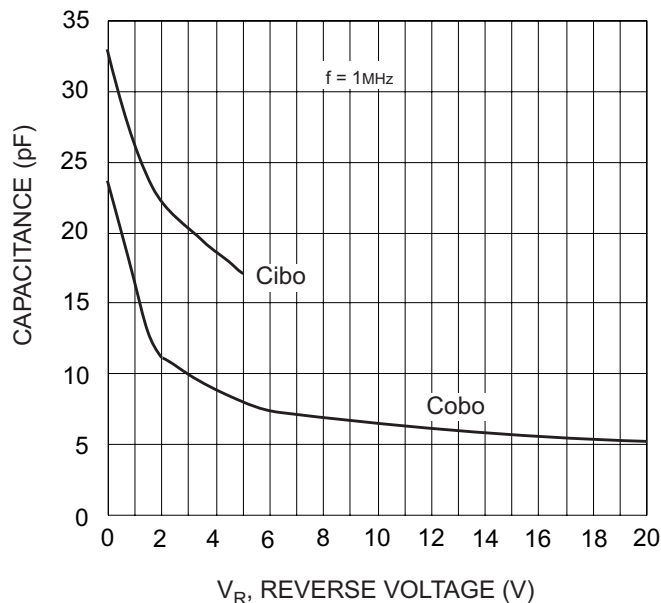


Fig. 3, Typical Capacitance Characteristics
(2907A Type - PNP)

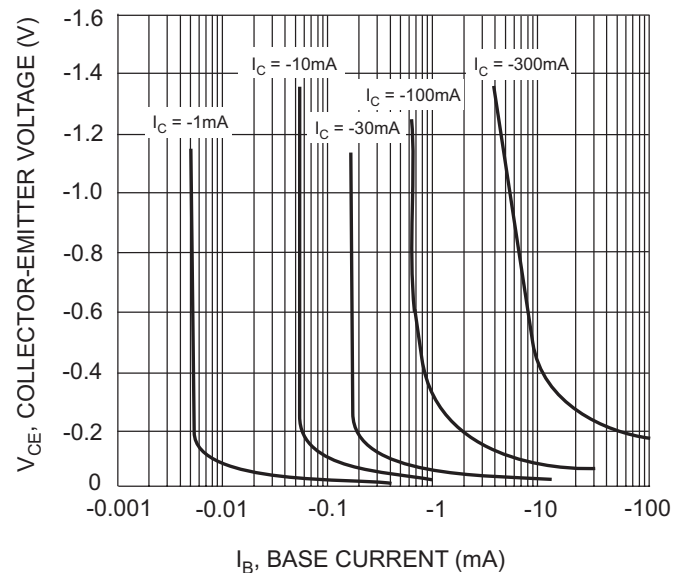


Fig. 4, Typical Collector Saturation Region
(2907A Type - PNP)

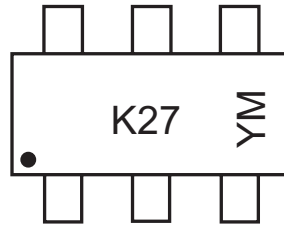
Ordering Information (Note 5)

[查询"MMDT2227_1"供应商](#)

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

IMPORTANT NOTICE

Diodes, Inc. and its subsidiaries reserve the right to make changes without further notice to any product herein to make corrections, modifications, enhancements, improvements, or other changes. Diodes, Inc. does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights, nor the rights of others. The user of products in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on our website, harmless against all damages.

LIFE SUPPORT

The products located on our website at www.diodes.com are not recommended for use in life support systems where a failure or malfunction of the component may directly threaten life or cause injury without the express written approval of Diodes Incorporated.