



MMDT2227A

COMPLEMENTARY NPN / PNP SMALL SIGNAL SURFACE MOUNT TRANSISTOR

VOLTAGE 60 Volts **POWER** 28) mW

SOT-363 Unit : inch(mm)

FEATURES

- Complementary Pair
- Epitaxial Planar Die Construction
- Ultra-Small Surface Mount Package
- One MMDT2222A-Type NPN
One MMDT2907A-Type PNP
- Ideal for Low Power Amplification and Switching
- Also Available in Lead Free Version
- Lead free in comply with EU RoHS 2002/95/EC directives.
- Green molding compound as per IEC61249 Std. . (Halogen Free)

MECHANICAL DATA

- Case: SOT-363
- Terminals : Solderable per MIL-STD-750,Method2026
- Approx Weight: 0.0002 ounces, 0.006 grams
- Device Marking : SOA

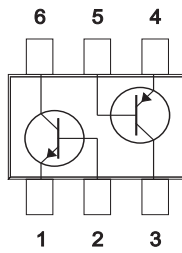
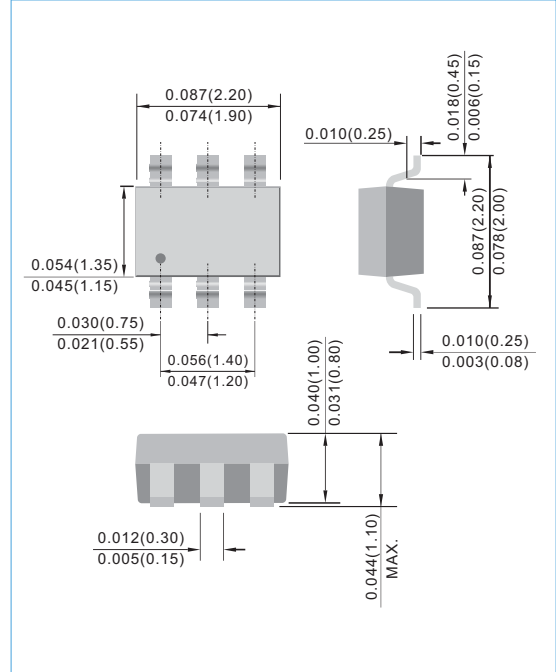


Fig.55



Maximum Ratings MMDT2222A Section @ T_A=25°C unless otherwise specified

Characteristic	Symbol	MMDT2222A	Units
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
Power Dissipation	P _d	225	mW
Thermal Resistance, Junction to Ambient	R _{θJA}	625	°C/W
Operation and Storage and Temperature Range	T _J , T _{STG}	-55 to +150	°C



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Maximum Ratings MMDT2907A Section @ $T_A=25^{\circ}\text{C}$ unless otherwise specified

Characteristic	Symbol	MMDT2907A	Units
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
Power Dissipation	P_d	200	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	625	$^{\circ}\text{C/W}$
Operation and Storage and Temperature Range	T_J, T_{STG}	-55 to +150	$^{\circ}\text{C}$



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Electrical Characteristics, MMDT222A Section @ $T_A=25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min.	Max.	Unit	Test Condition
OFF CHARACTERISTICS(Note 2)					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	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}	-	100	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 2)					
DC Current Gain	h_{FE}	35 50 75 100 40 50 50	- - - 300 - - -	-	$I_C=100\mu\text{A}, V_{CE}=10\text{V}$ $I_C=1.0\text{mA}, V_{CE}=10\text{V}$ $I_C=10\text{mA}, V_{CE}=10\text{V}$ $I_C=150\text{mA}, V_{CE}=10\text{V}$ $I_C=500\text{mA}, V_{CE}=10\text{V}$ $I_C=10\text{mA}, V_{CE}=10\text{V}, T_A=-55^\circ\text{C}$ $I_C=150\text{mA}, V_{CE}=1.0\text{V}$
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	



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Electrical Characteristics, MMDT2907A Section @ $T_A=25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min.	Max.	Unit	Test Condition
OFF CHARACTERISTICS(Note 2)					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-60	-	V	$I_C=-10\mu\text{A}, I_E=0$
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 2)					
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	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_{on}	-	45	ns	$I_C=-150\text{mA}, V_{CC}=-30\text{V}, I_{B1}=-15\text{mA}$
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	



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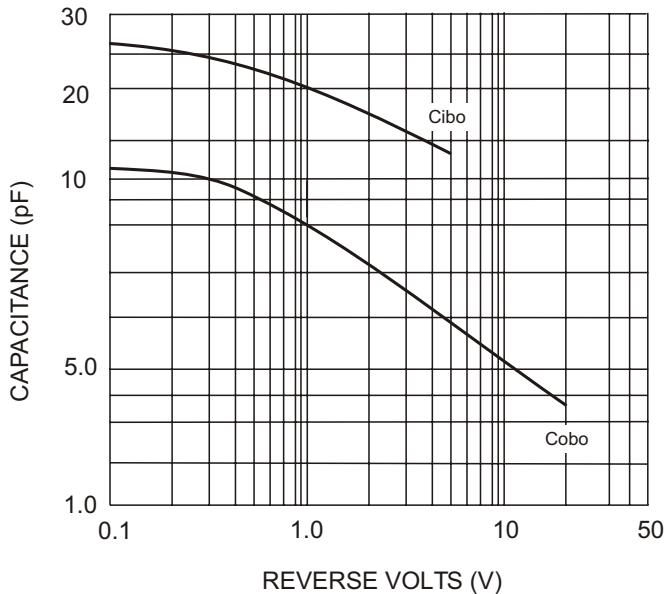


Fig. 1 (2222A) Typical Capacitance

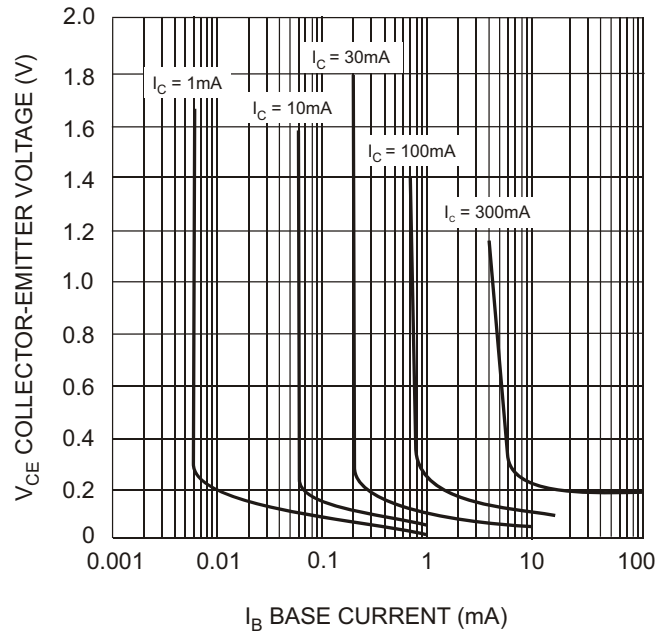


Fig. 2 (2222A) Typical Collector Saturation Region

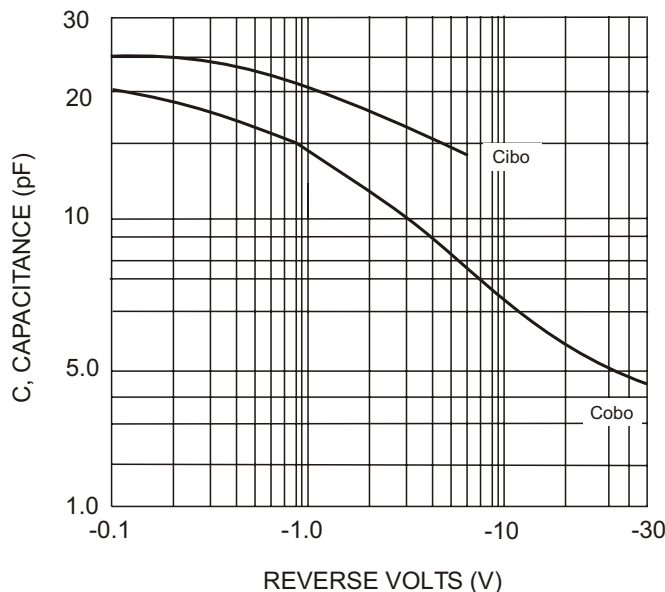


Fig. 3 (2907A) Typical Capacitance

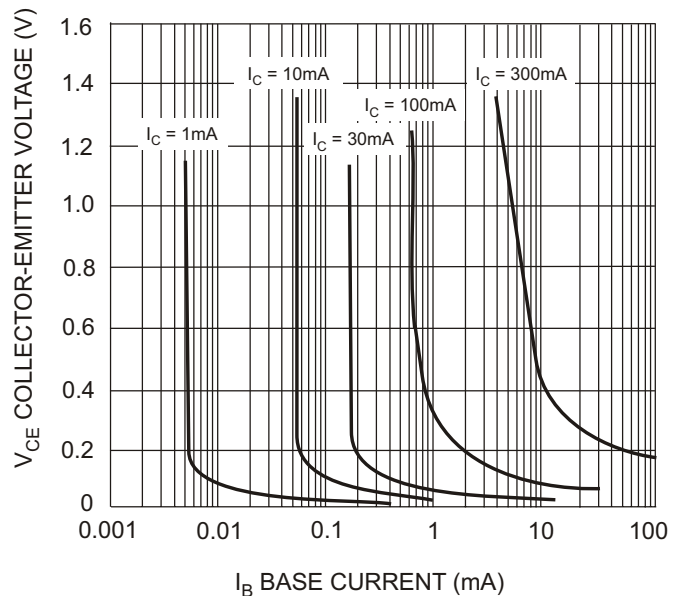
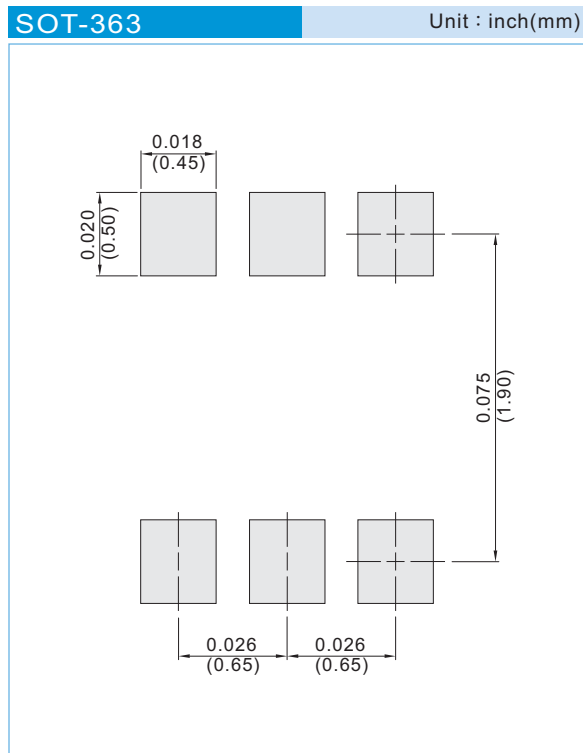


Fig. 4 (2907A) Typical Collector Saturation Region



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MOUNTING PAD LAYOUT



ORDER INFORMATION

- Packing information
 - T/R - 10K per 13" plastic Reel
 - T/R - 3K per 7" plastic Reel

LEGAL STATEMENT

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