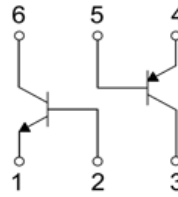


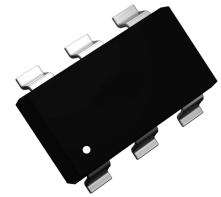
MMDT2227 Complementary NPN+PNP Transistor

Features

- Complementary pairs
- One 2222A-type NPN
- One 2907A-type PNP
- Epitaxial planar die construction
- Ideal for power amplification and switching



Schematic Diagram



SOT-363

NPN Absolute Maximum Ratings

($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Rating	Unit
Collector-Base Voltage	V_{CB0}	75	V
Collector-Emitter Voltage	V_{CE0}	40	V
Emitter-Base Voltage	V_{EB0}	6	V
Collector Current-Continuous	I_C	600	mA
Collector Power Dissipation	P_C	200	mW
Junction Temperature	T_J	-55 to +150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55 to +150	$^{\circ}\text{C}$

PNP Absolute Maximum Ratings

($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Rating	Unit
Collector-Base Voltage	V_{CB0}	-60	V
Collector-Emitter Voltage	V_{CE0}	-60	V
Emitter-Base Voltage	V_{EB0}	-5	V
Collector Current-Continuous	I_C	-600	mA
Collector Power Dissipation	P_C	200	mW
Junction Temperature	T_J	-55 to +150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55 to +150	$^{\circ}\text{C}$

NPN Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Max	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C=10\mu\text{A}, I_E=0$	75	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=10\text{mA}, I_B=0$	40	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E=10\mu\text{A}, I_C=0$	6	-	V
Collector Cut-off Current	I_{CBO}	$V_{CB}=60\text{V}, I_E=0$	-	10	nA
Collector Cut-off Current	I_{CEX}	$V_{CE}=60\text{V}, V_{EB(OFF)}=3\text{V}$	-	10	nA
Emitter Cut-off Current	I_{EBO}	$V_{EB}=3\text{V}, I_C=0$	-	10	nA
DC Current Gain ¹	h_{FE}	$V_{CE}=10\text{V}, I_C=0.1\text{mA}$	35	-	-
		$V_{CE}=10\text{V}, I_C=1\text{mA}$	50	-	
		$V_{CE}=10\text{V}, I_C=10\text{mA}$	75	-	
		$V_{CE}=10\text{V}, I_C=150\text{mA}$	100	300	
		$V_{CE}=10\text{V}, I_C=500\text{mA}$	40	-	
		$V_{CE}=1\text{V}, I_C=150\text{mA}$	35	-	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=150\text{mA}, I_B=15\text{mA}$	-	0.3	V
		$I_C=500\text{mA}, I_B=50\text{mA}$	-	1	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C=150\text{mA}, I_B=15\text{mA}$	0.6	1.2	V
		$I_C=500\text{mA}, I_B=50\text{mA}$	-	2	V
Transition Frequency	f_T	$V_{CE}=20\text{V}, I_C=20\text{mA}, f=100\text{MHz}$	300	-	MHz
Output Capacitance	C_{ob}	$V_{CB}=10\text{V}, I_E=0, f=1\text{MHz}$	-	8	pF
Input Capacitance	C_{ib}	$V_{EB}=0.5\text{V}, I_C=0, f=1\text{MHz}$	-	25	pF
Noise Figure	N_F	$V_{CE}=10\text{V}, I_C=0.1\text{mA}, f=1\text{KHz}, R_S=1\text{k}\Omega$	-	4	dB
Delay Time	t_d	$V_{CC}=30\text{V}, I_C=150\text{mA}, V_{BE(OFF)}=0.5\text{V}, I_{B1}=15\text{mA}$	-	10	nS
Rise Time	t_r		-	25	nS
Storage Time	t_s		-	225	nS
Fall Time	t_f		-	60	nS

Note

1. Pluse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

PNP Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Max	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C=-10\mu\text{A}, I_E=0$	-60	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=-10\text{mA}, I_B=0$	-60	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E=-10\mu\text{A}, I_C=0$	-5	-	V
Collector Cut-off Current	I_{CBO}	$V_{CB}=-50\text{V}, I_E=0$	-	-10	nA
Collector Cut-off Current	I_{CEX}	$V_{CE}=-30\text{V}, V_{EB(off)}=-0.5\text{V}$	-	-50	nA
Emitter Cut-off Current	I_{EBO}	$V_{EB}=-3\text{V}, I_C=0$	-	-10	nA
DC Current Gain ¹	h_{FE}	$V_{CE}=-10\text{V}, I_C=-0.1\text{mA}$	75	-	-
		$V_{CE}=-10\text{V}, I_C=-1\text{mA}$	100	-	
		$V_{CE}=-10\text{V}, I_C=-10\text{mA}$	100	-	
		$V_{CE}=-10\text{V}, I_C=-150\text{mA}$	100	300	
		$V_{CE}=-10\text{V}, I_C=-500\text{mA}$	50	-	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=-150\text{mA}, I_B=-15\text{mA}$	-	-0.4	V
		$I_C=-500\text{mA}, I_B=-50\text{mA}$	-	-1.6	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C=-150\text{mA}, I_B=-15\text{mA}$	-	-1.3	V
		$I_C=-500\text{mA}, I_B=-50\text{mA}$	-	-2.6	V
Transition Frequency	f_T	$V_{CE}=-20\text{V}, I_C=-50\text{mA}, f=100\text{MHz}$	200	-	MHz
Output Capacitance	C_{ob}	$V_{CB}=-10\text{V}, I_E=0, f=1\text{MHz}$	-	8	pF
Input Capacitance	C_{ib}	$V_{EB}=-2\text{V}, I_C=0, f=1\text{MHz}$	-	30	pF
Delay Time	t_d	$V_{CC}=-30\text{V}, I_C=-150\text{mA}, I_{B1}=-15\text{mA}$	-	10	nS
Rise Time	t_r		-	40	nS
Storage Time	t_s		-	225	nS
Fall Time	t_f		-	60	nS

Note

1. Pluse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

NPN Typical Characteristic Curves

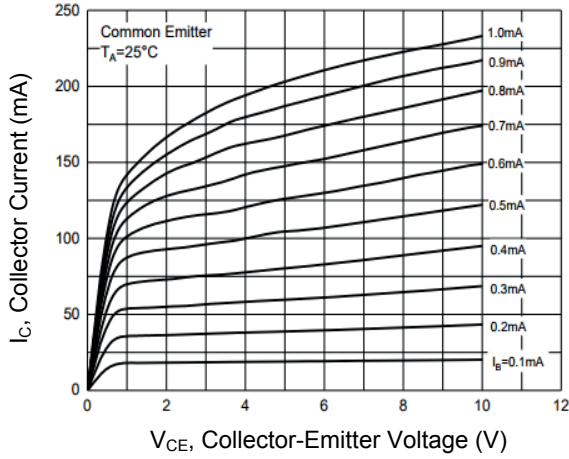


Figure 1. Static Characteristics

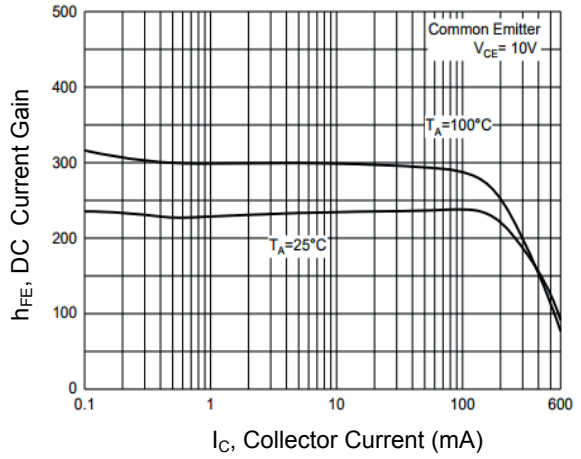


Figure 2. DC Current Gain Characteristics

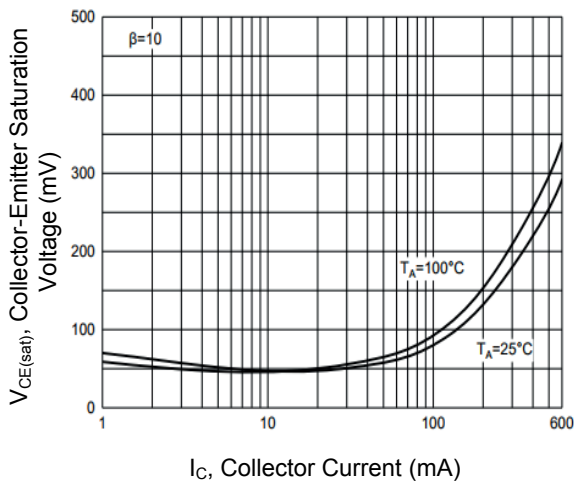


Figure 3. Collector-Emitter Saturation Voltage Characteristics

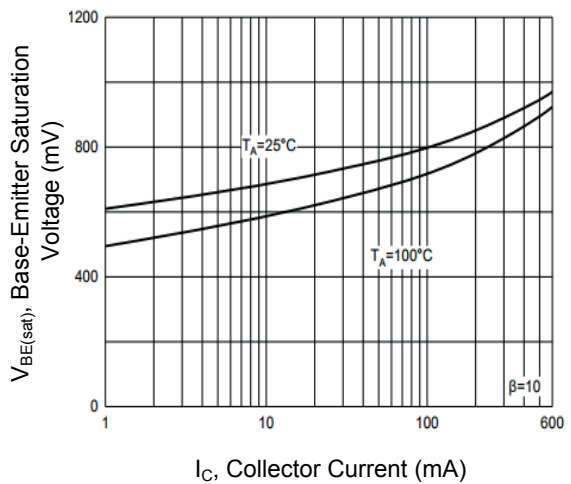


Figure 4. Base-Emitter Saturation Voltage Characteristics

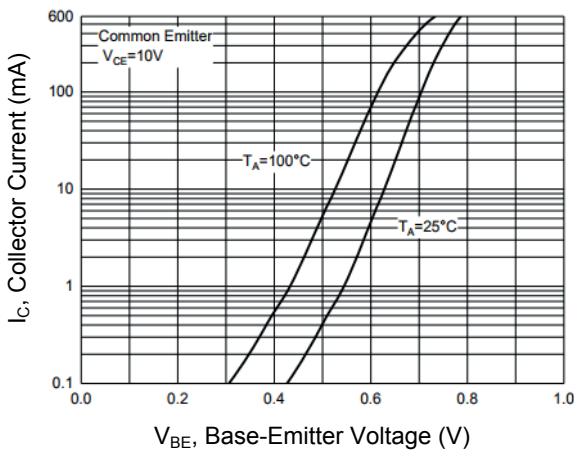


Figure 5. Base-Emitter Voltage Characteristics

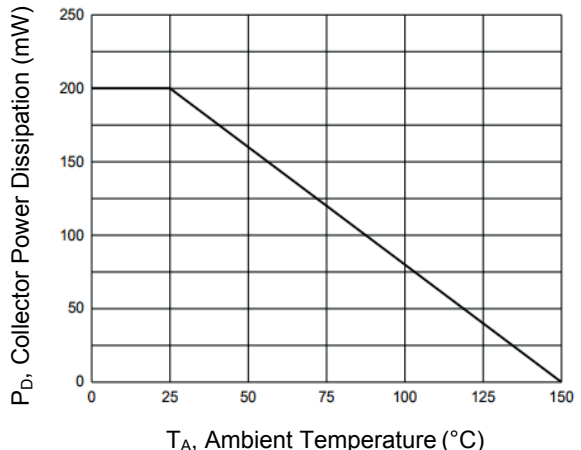


Figure 6. Collector Power Derating Curve

PNP Typical Characteristic Curves

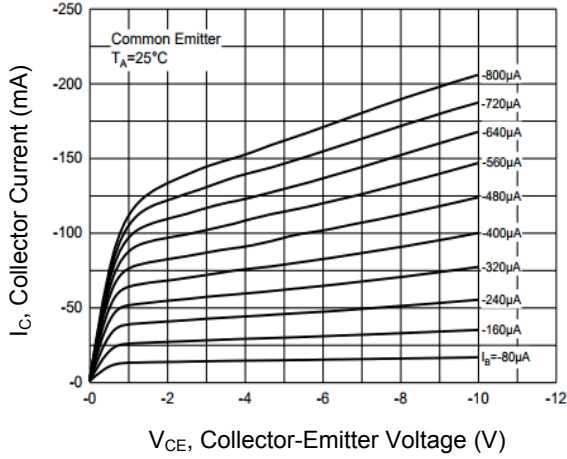


Figure 7. Static Characteristics

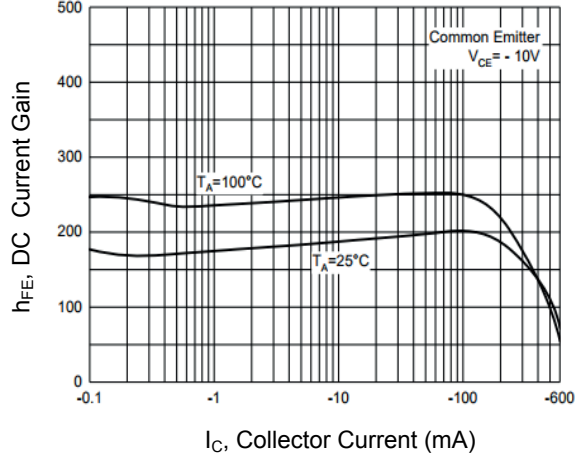


Figure 8. DC Current Gain Characteristics

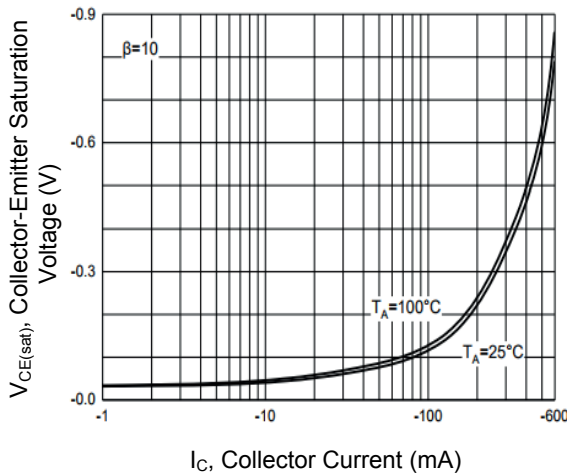


Figure 9. Collector-Emitter Saturation Voltage Characteristics

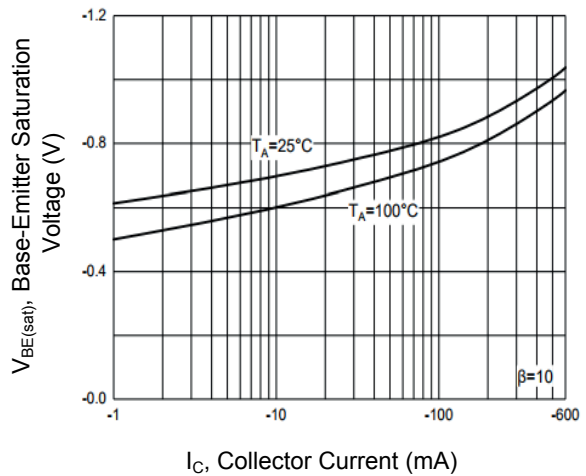


Figure 10. Base-Emitter Saturation Voltage Characteristics

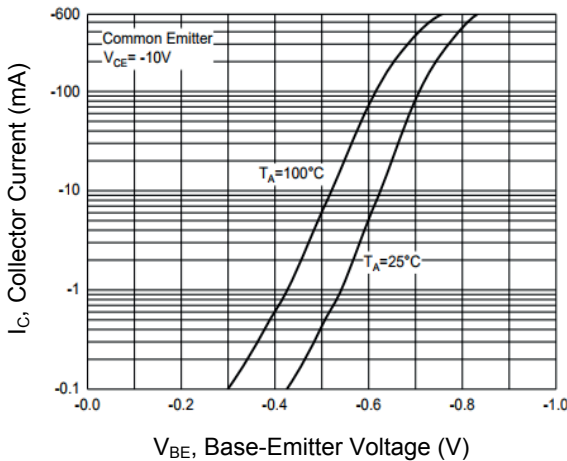


Figure 11. Base-Emitter Voltage Characteristics

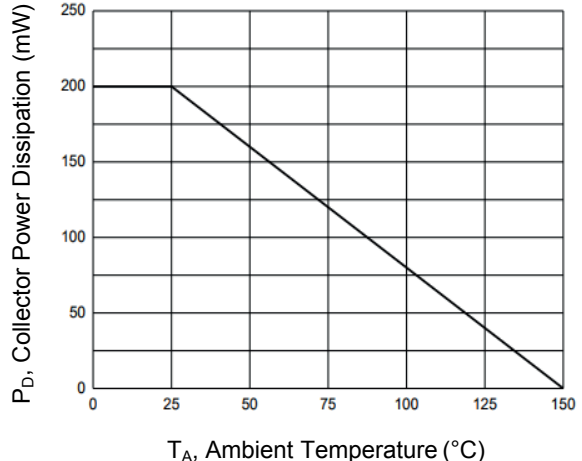
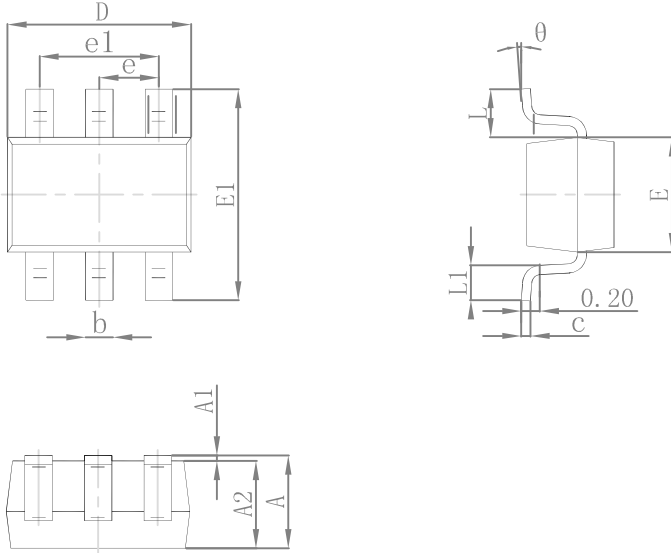


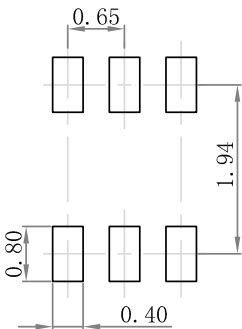
Figure 12. Collector Power Derating Curve

Package Outline Dimensions (SOT-363)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

Recommended Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ± 0.05mm.
3. The pad layout is for reference purposes only.

Ordering Information

Device	Package	Marking	Quantity	HSF Status
MMDT2227	SOT-363	K27	3,000pcs / Reel	RoHS Compliant

For more information, please contact us at: inquiry@goodarksemi.com