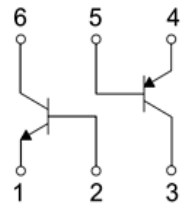
GOOD-ARK SEMICONDUCTOR

MMDT5451

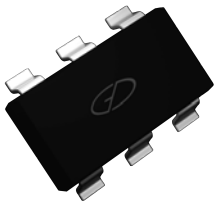
Complementary NPN+PNP Transistor

Features

- Complementary pair
- One 5551-Type NPN
- One 5401-Type PNP
- Epitaxial planar die construction
- Ideal for low power amplification and switching



Schematic Diagram



SOT-363

NPN Absolute Maximum Ratings

(T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	180	V
Collector-Emitter Voltage	V_{CEO}	160	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current-Continuous	I_C	0.2	A
Collector Power Dissipation	P_D	0.2	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	625	°C/W
Junction Temperature	T_J	-55 to +150	°C
Storage Temperature	T_{STG}	-55 to +150	°C

PNP Absolute Maximum Ratings

(T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-160	V
Collector-Emitter Voltage	V_{CEO}	-150	V
Emitter-Base Voltage	V_{EBO}	-5	V
Collector Current-Continuous	I_C	-0.2	A
Collector Power Dissipation	P_D	0.2	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	625	°C/W
Junction Temperature	T_J	-55 to +150	°C
Storage Temperature	T_{STG}	-55 to +150	°C

NPN Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Max	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=100μA, I_E=0	180	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=1mA, I_B=0	160	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=10μA, I_C=0	6	-	V
Collector Cut-off Current	I_{CBO}	V_{CB}=120V, I_E=0	-	0.05	μA
Emitter Cut-off Current	I_{EBO}	V_{EB}=4V, I_C=0	-	0.05	μA
DC Current Gain	h_{FE}	V_{CE}=5V, I_C=1mA	80	-	-
		V_{CE}=5V, I_C=10mA	100	300	
		V_{CE}=5V, I_C=50mA	30	-	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=10mA, I_B=1mA	-	0.15	V
		I_C=50mA, I_B=5mA	-	0.2	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C=10mA, I_B=1mA	-	1	V
		I_C=500mA, I_B=5mA	-	1	V
Output Capacitance	C_{ob}	V_{CB}=10V, f=1.0MHz, I_E=0	-	6.0	pF
Current Gain-Bandwidth Product	f_T	V_{CE}=10V, I_C=10mA, f=100MHz	100	300	MHz
Noise Figure	NF	V_{CE}=5.0V, I_C=0.2mA, R_S=1.0kΩ, f=1.0kHz	-	8.0	dB

PNP Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Max	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=-100μA, I_E=0	-160	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=-1mA, I_B=0	-150	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=-10μA, I_C=0	-5	-	V
Collector Cut-off Current	I_{CBO}	V_{CB}=-120V, I_E=0	-	-50	nA
Emitter Cut-off Current	I_{EBO}	V_{EB}=-3V, I_C=0	-	-50	nA
DC Current Gain	h_{FE}	V_{CE}=-5V, I_C=-1mA	50	-	-
		V_{CE}=-5V, I_C=-10mA	100	300	
		V_{CE}=-5V, I_C=-50mA	50	-	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=-10mA, I_B=-1mA	-	-0.2	V
		I_C=-50mA, I_B=-5mA	-	-0.5	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C=-10mA, I_B=-1mA	-	-1	V
		I_C=-50mA, I_B=-5mA	-	-1	V
Output Capacitance	C_{ob}	V_{CB}=-10V, f=1.0MHz, I_E=0	-	6.0	pF
Current Gain-Bandwidth Product	f_T	V_{CE}=-10V, I_C=-10mA, f=100MHz	100	300	MHz
Noise Figure	NF	V_{CE}=-5.0V, I_C=-0.2mA, R_S=10Ω, f=1.0kHz	-	8.0	dB

NPN Typical Characteristic Curves

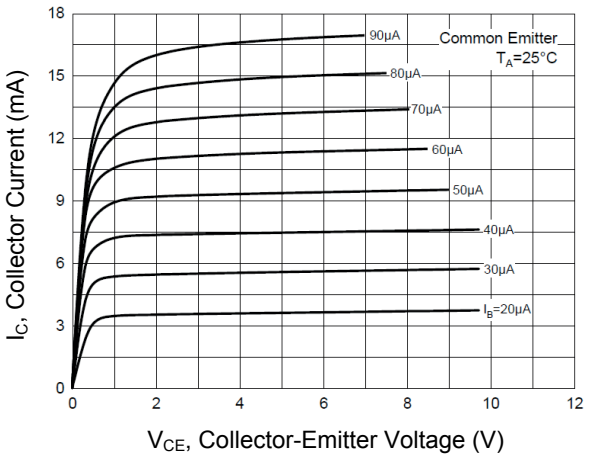


Figure 1. Static Characteristics

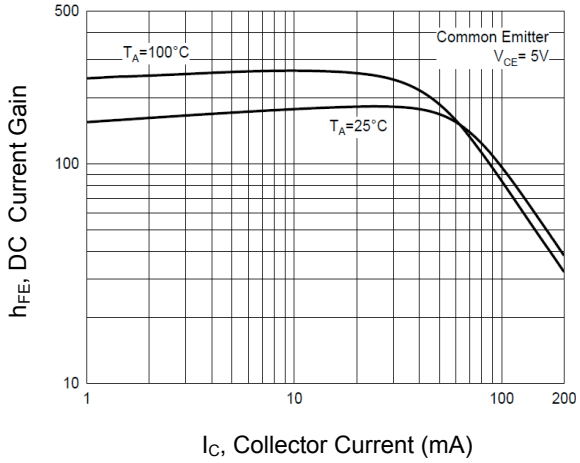


Figure 2. DC Current Gain Characteristics

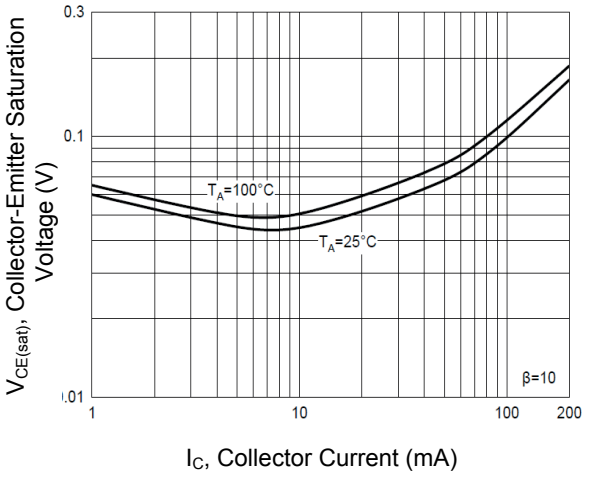


Figure 3. Collector-Emitter Saturation Voltage Characteristics

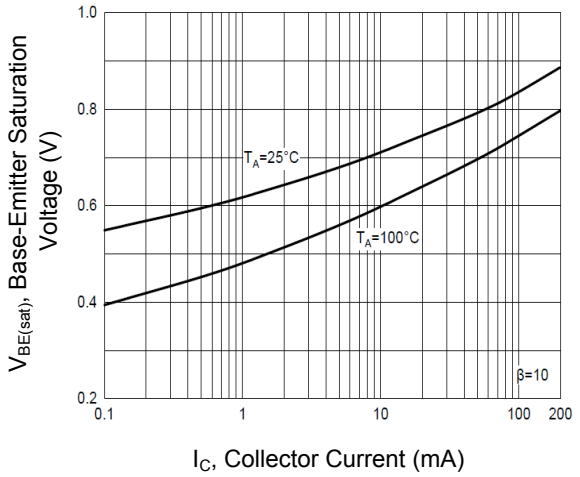


Figure 4. Base-Emitter Saturation Voltage Characteristics

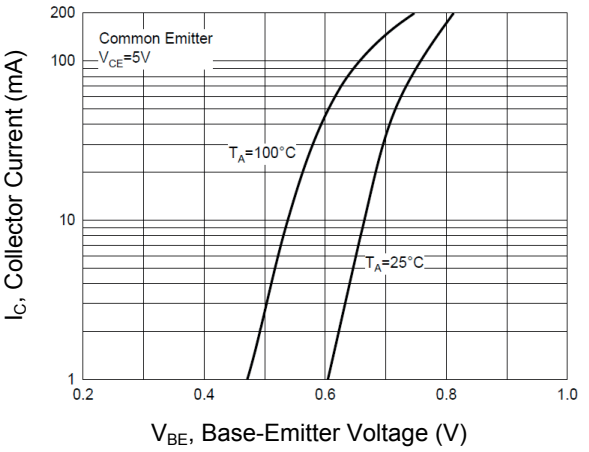


Figure 5. Base-Emitter Voltage Characteristics

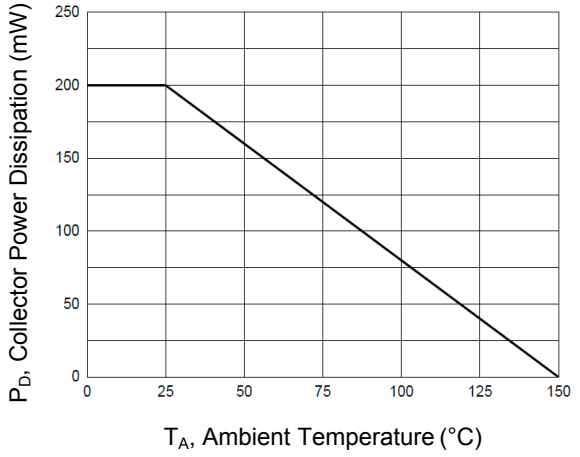


Figure 6. Collector Power Derating Curve

PNP Typical Characteristic Curves

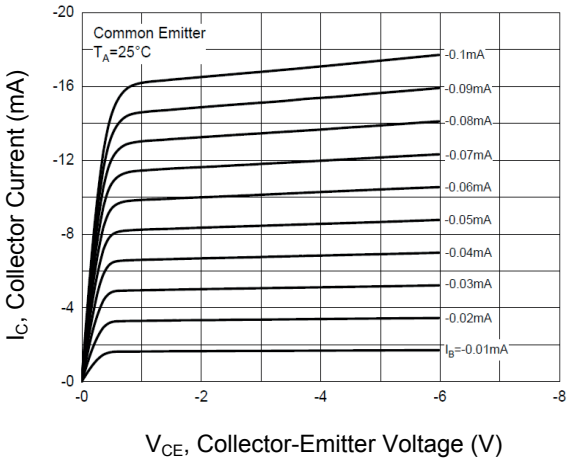


Figure 7. Static Characteristics

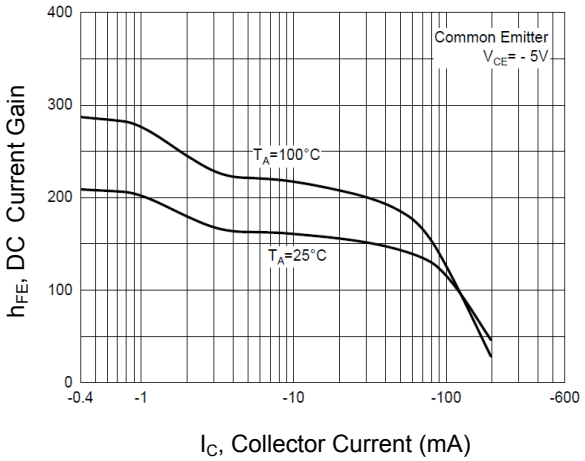


Figure 8. DC Current Gain Characteristics

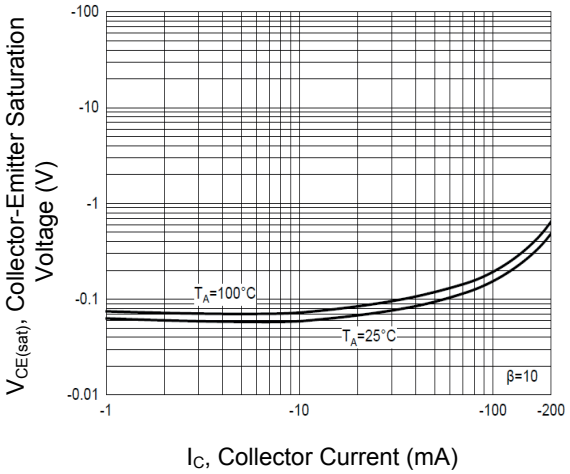


Figure 9. Collector-Emitter Saturation Voltage Characteristics

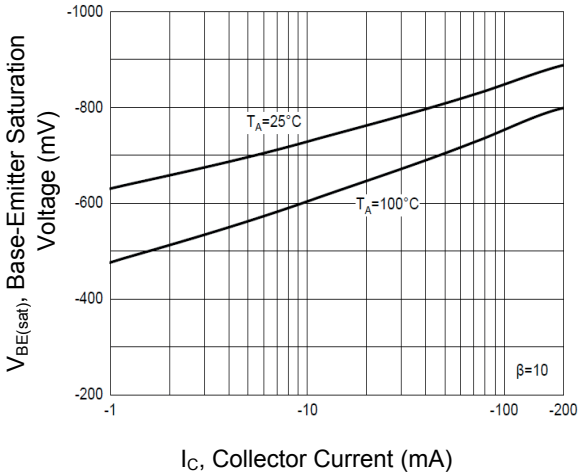


Figure 10. Base-Emitter Saturation Voltage Characteristics

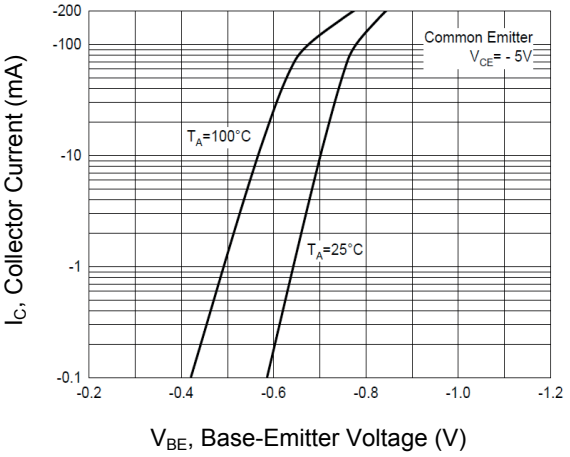


Figure 11. Base-Emitter Voltage Characteristics

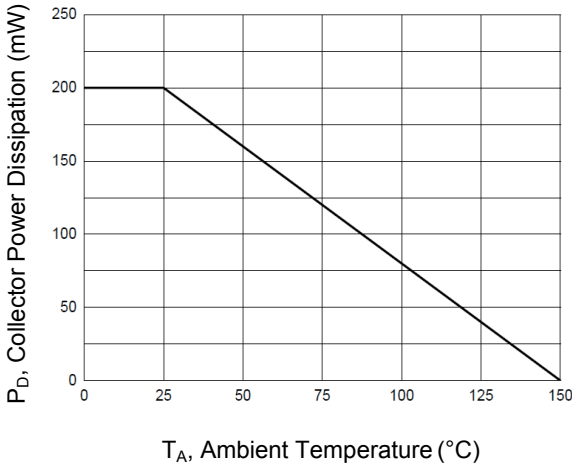
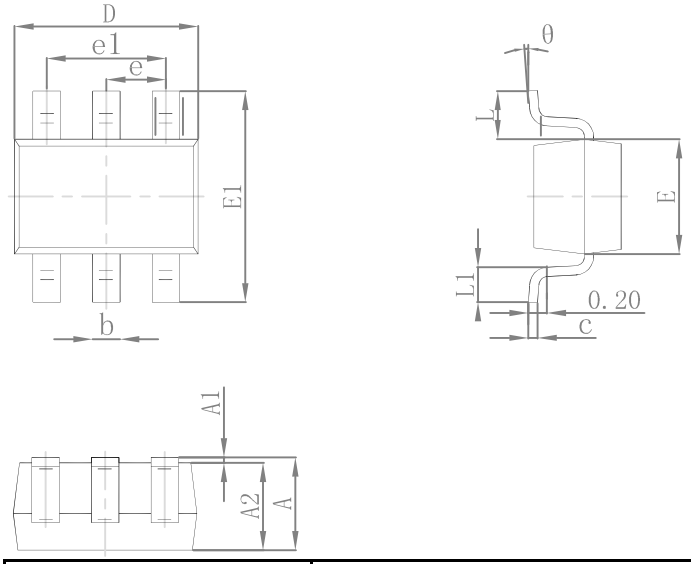


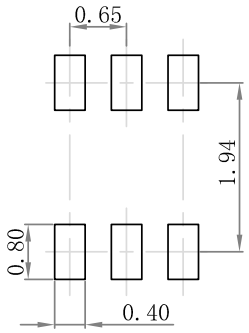
Figure 12. Collector Power Derating Curve

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
MMDT5451	SOT-363	KNM	3,000pcs / Reel	RoHS Compliant