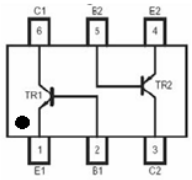
NPN/PNP General Purpose Transistor

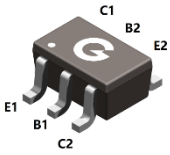
MMDT2227

Features

HF

- Epitaxial planar die construction
- Two internal isolated NPN/PNP transistors in one package
- Ultra-small surface mount package





SOT-363

Mechanical Data

- Case: SOT-363
- Molding compound: UL flammability classification rating 94V-0
- Terminals: Tin-plated; solderability per MIL-STD-202, Method 208

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
MMDT2227	SOT-363	3000 pcs / Tape & Reel	K27

Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter	Symbol	NPN	PNP	Unit
Collector-Base Voltage	V_{CBO}	75	-60	V
Collector-Emitter Voltage	V_{CEO}	40	-60	V
Emitter-Base Voltage	V_{EBO}	6	-5	V
Collector Current (Continuous)	I_C	0.6	-0.6	A
Collector Current (Pulse)	I_{CM}	1.2	-1.2	A

Thermal Characteristics

Parameter	Symbol	Value	Unit
Power Dissipation *1	P_D	0.2	W
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	625	°C/W
Thermal Resistance Junction-to-Air *2	$R_{\theta JA}$	350	°C/W
Thermal Resistance Junction-to-Case *2	$R_{\theta JC}$	250	°C/W
Thermal Resistance Junction-to-Lead *2	$R_{\theta JL}$	300	°C/W
Operating Junction Temperature	T_J	-55 ~ +150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

Electrical Characteristics of NPN Transistor (@ T_A = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 10μA, I_E = 0	75	-	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 10mA, I_B = 0	40	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = 10μA, I_C = 0	6	-	-	V
Collector Cut-off Current	I_{CBO}	V_{CB} = 60V, I_E = 0	-	-	10	nA
		V_{CB} = 60V, I_E = 0, T_J = 150°C	-	-	10	μA
Collector Cut-off Current	I_{CEX}	V_{CE} = 60V, $V_{EB(OFF)}$ =3V	-	-	10	nA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 3V, I_C = 0	-	-	10	nA
Base Cut-off Current	I_{BL}	V_{CE} = 60V, $V_{EB(OFF)}$ = 3V	-	-	20	nA
DC Current Gain	h_{FE}	V_{CE} = 10V, I_C = 0.1mA	35	-	-	-
		V_{CE} = 10V, I_C = 1mA	50	-	-	-
		V_{CE} = 10V, I_C = 10mA	75	-	-	-
		V_{CE} = 10V, I_C = 150mA	100	-	300	-
		V_{CE} = 10V, I_C = 500mA	40	-	-	-
		V_{CE} = 10V, I_C = 10mA, T_J = -55°C	50	-	-	-
		V_{CE} = 1V, I_C = 150mA	35	-	-	-
Collector-emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 150mA, I_B = 15mA	-	-	0.3	V
		I_C = 500mA, I_B = 50mA	-	-	1.0	V
Base-emitter Saturation Voltage	$V_{BE(sat)}$	I_C = 150mA, I_B = 15mA	0.6	-	1.2	V
		I_C = 500mA, I_B = 50mA	-	-	2.0	V
Transition Frequency	f_T	V_{CE} = 20V,I_C = 20mA,f = 100MHz	300	-	-	MHz
Output Capacitance	C_{OBO}	V_{CB} = 10V, I_E = 0, f = 1MHZ	-	-	8	pF
Input Capacitance	C_{ibo}	V_{EB} = 0.5V, f = 1.0MHz, I_C = 0	-	-	25	pF
Noise Figure	NF	V_{CE} = 10V, f = 1.0kHz I_C = 0.1mA, R_G = 1.0KΩ	-	-	4.0	dB
Delay Time	t_d	V_{CC} = 30V, I_C = 150mA $V_{BE(off)}$ = - 0.5V, I_{B1} = 15mA	-	-	10	ns
Rise Time	t_r		-	-	25	ns
Storage Time	t_s	V_{CC} = 30V, I_C = 150mA I_{B1} = I_{B2} = 15mA	-	-	225	ns
Fall Time	t_f		-	-	60	ns

Electrical Characteristics of PNP Transistor (@ T_A = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = -10μA, I_E = 0	-60	-	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = -10mA, I_B = 0	-60	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = -10μA, I_C = 0	-5	-	-	V
Collector Cut-off Current	I_{CBO}	V_{CB} = -50V, I_E = 0	-	-	-10	nA
		V_{CB} = -50V, I_E = 0, T_J = 125°C	-	-	-10	μA
Collector Cut-off Current	I_{CEX}	V_{CE} = -30V, $V_{EB(OFF)}$ = -0.5V	-	-	-50	nA
Base Cut-off Current	I_{BL}	V_{CE} = -30V, $V_{EB(OFF)}$ = -0.5V	-	-	-50	nA
DC Current Gain	h_{FE}	V_{CE} = -10V, I_C = -0.1mA	75	-	-	-
		V_{CE} = -10V, I_C = -1mA	100	-	-	-
		V_{CE} = -10V, I_C = -10mA	100	-	-	-
		V_{CE} = -10V, I_C = -150mA	100	-	300	-
		V_{CE} = -10V, I_C = -500mA	50	-	-	-
Collector-emitter Saturation Voltage	$V_{CE(sat)}$	I_C = -150mA, I_B = -15mA	-	-	-0.4	V
		I_C = -500mA, I_B = -50mA	-	-	-1.6	V
Base-emitter Saturation Voltage	$V_{BE(sat)}$	I_C = -150mA, I_B = -15mA	-	-	-1.3	V
		I_C = -500mA, I_B = -50mA	-	-	-2.6	V
Transition Frequency	f_T	V_{CE}=-20V,I_C= -50mA,f = 100MHz	200	-	-	MHz
Output Capacitance	C_{OBO}	V_{CB} = -10V, I_E = 0, f = 1MHZ	-	-	8	pF
Input Capacitance	C_{ibo}	V_{EB} = -2V, f = 1.0MHz, I_C = 0	-	-	30	pF
Delay Time	t_d	V_{CC} = -30V, I_C = -150mA	-	-	10	ns
Rise Time	t_r	I_{B1} = -15mA	-	-	40	ns
Storage Time	t_s	V_{CC} = -6V, I_C = -150mA	-	-	80	ns
Fall Time	t_f	I_{B1} = I_{B2} = -15mA	-	-	30	ns

Notes:

1. Device mounted on a minimum recommended pad layout with 1oz copper that is on a single-sided 1.6mm FR4 PCB; the device is measured under still air conditions whilst operating in a steady-state.
2. The data tested by surface mounted on a 25.4mm * 25.4mm * 1mm FR4-epoxy P.C.B

Ratings and Characteristic Curves-NPN (@ T_A = 25°C unless otherwise specified)

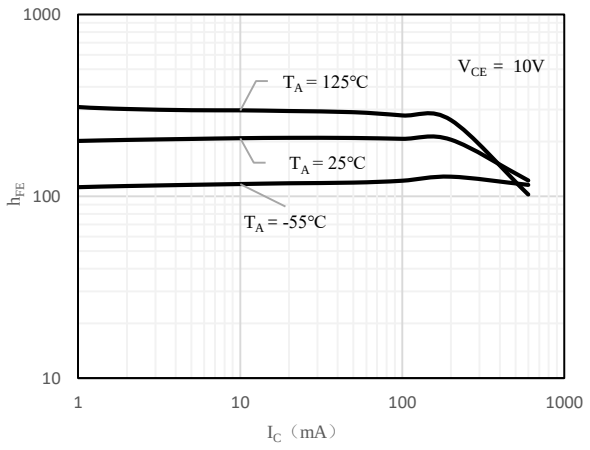


Fig 1 h_{FE} vs. I_C

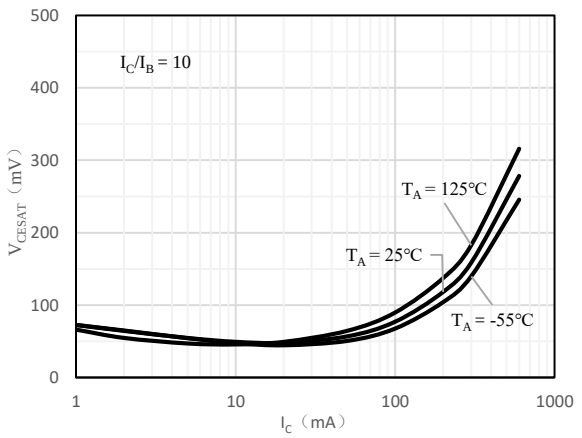


Fig 2 $V_{CE(sat)}$ vs. I_C

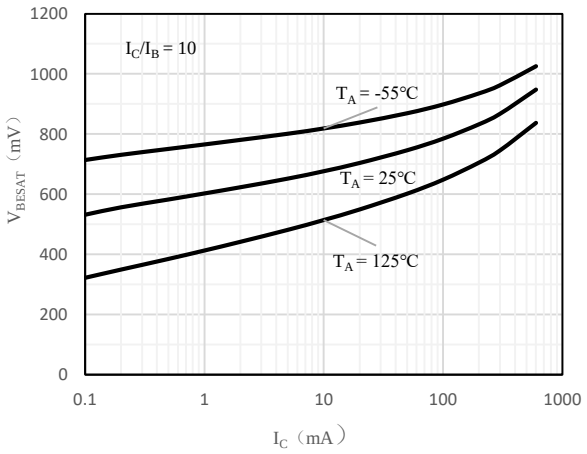


Fig 3 $V_{BE(sat)}$ vs. I_C

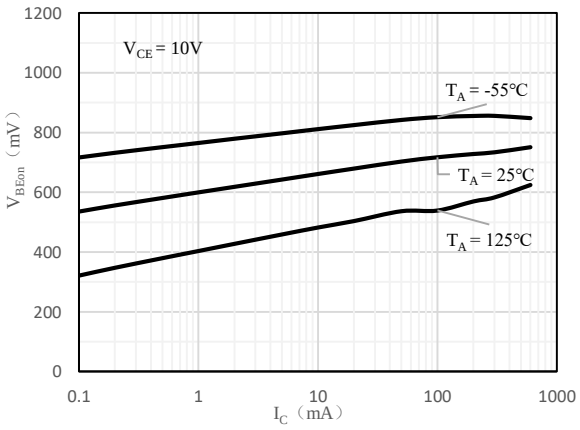


Fig 4 $V_{BE(ON)}$ vs. I_C

Ratings and Characteristic Curves-PNP (@ T_A = 25℃ unless otherwise specified)

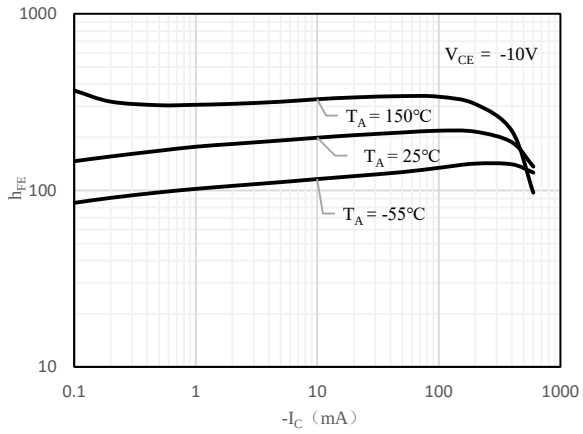


Fig 1 h_{FE} vs. I_C

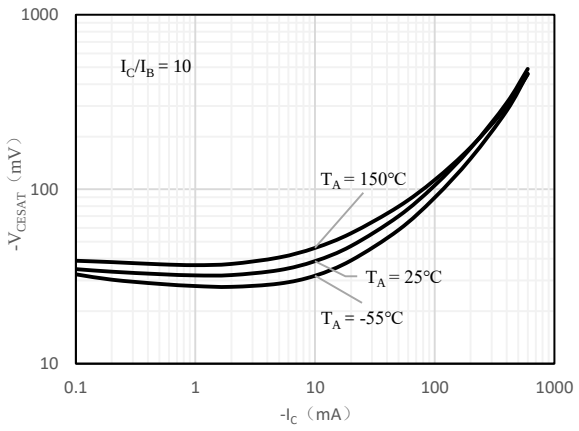


Fig 2 $V_{CE(sat)}$ vs. I_C

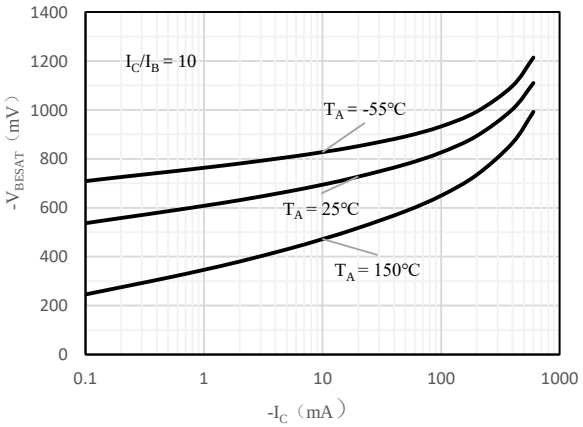


Fig 3 $V_{BE(sat)}$ vs. I_C

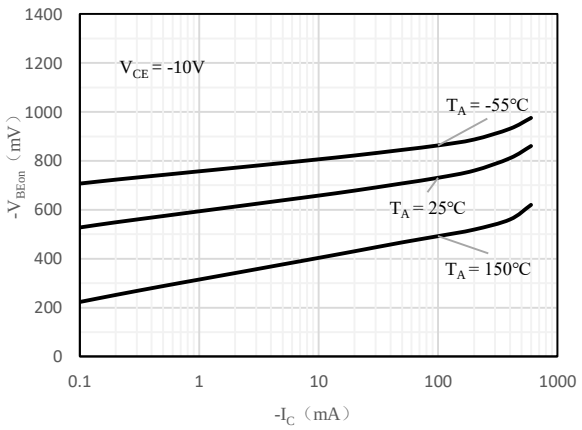
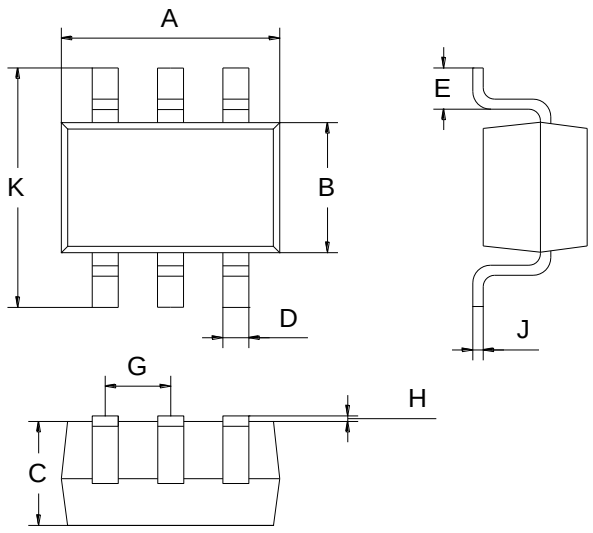


Fig 4 $V_{BE(ON)}$ vs. I_C

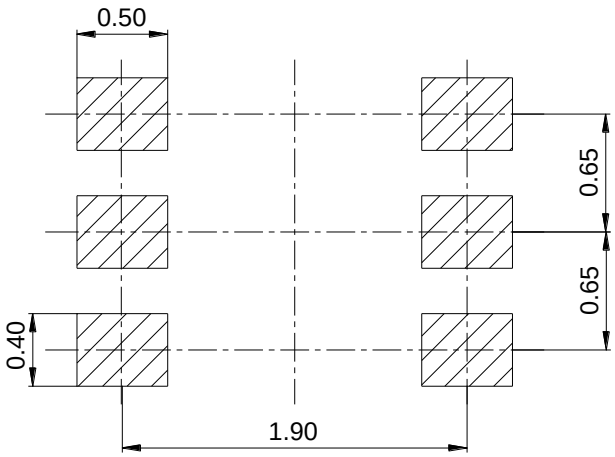
Package Outline Dimensions (Unit: mm)



SOT-363		
Dimension	**Min.**	**Max.**
A	2.00	2.20
B	1.15	1.35
C	0.85	1.05
D	0.15	0.35
E	0.25	0.40
G	0.60	0.70
H	0.02	0.10
J	0.05	0.15
K	2.20	2.40

Mounting Pad Layout (Unit: mm)

SOT-363



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