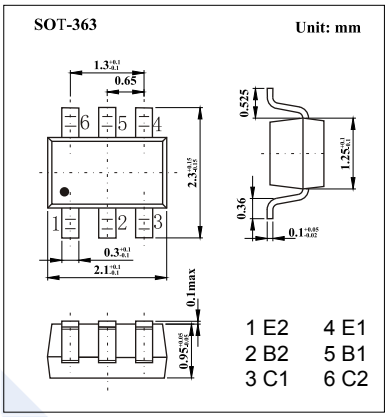
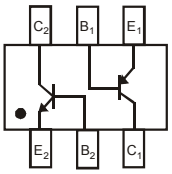
Complementary NPN/PNP Transistors

MMDT2227 (KMDT2227)



■ Features

- Complementary Pairs One 2222A Type (NPN)
  One 2907A Type (PNP)
- Ideal for Low Power Amplification and Switching
- Lead Free/RoHS Compliant



■ Absolute Maximum Ratings Ta = 25℃

Parameter	Symbol		Rating	Unit
Collector - Base Voltage	V_{CBO}	NPN	75	V
		PNP	-60	
Collector - Emitter Voltage	V_{CEO}	NPN	40	
		PNP	-60	
Emitter - Base Voltage	V_{EBO}	NPN	6	
		PNP	-5	
Collector Current - Continuous	I_C	NPN	600	mA
		PNP	-600	
Collector Power Dissipation (Note.1)	P_C		0.2	W
Thermal Resistance, Junction to Ambient (Note.1)	$R_{\theta JA}$		625	°C/W
Junction Temperature	T_J		150	℃
Storage Temperature Range	T_{stg}		-65 to 150	

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.

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■ Electrical Characteristics Ta = 25℃(NPN)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector- base breakdown voltage	V_{CBO}	I_C= 100 μA， I_E= 0	75			V
Collector- emitter breakdown voltage	V_{CEO}	I_C= 10 mA， I_B= 0	40			
Emitter - base breakdown voltage	V_{EBO}	I_E= 100 μ A， I_C= 0	6			
Collector-base cut-off current	I_{CBO}	V_{CB}= 60 V , I_E= 0			10	nA
		V_{CB}= 60 V , I_E= 0,Ta=150℃			10	uA
Collector- emitter cut-off current	I_{CEX}	V_{CE}= 60 V ,$V_{EB(OFF)}$=3V			10	nA
Base Cutoff Current	I_{BL}	V_{CE}= 60 V ,$V_{EB(OFF)}$=3V			20	
Emitter cut-off current	I_{EBO}	V_{EB}= 4V , I_C=0			10	
Collector-emitter saturation voltage (Note.1)	$V_{CE(sat)}$	I_C=150 mA, I_B=15mA			0.3	V
		I_C=500 mA, I_B=50mA			1	
Base - emitter saturation voltage (Note.1)	$V_{BE(sat)}$	I_C= 150 mA, I_B= 15mA	0.6		1.2	
		I_C=500 mA, I_B=50mA			2	
DC current gain (Note.1)	$h_{FE(1)}$	V_{CE}= 10V, I_C= 100uA	35			
	$h_{FE(2)}$	V_{CE}= 10V, I_C= 1mA	50			
	$h_{FE(3)}$	V_{CE}= 10V, I_C= 10mA	75			
	$h_{FE(4)}$	V_{CE}= 10V, I_C= 150mA	100		300	
	$h_{FE(5)}$	V_{CE}= 10V, I_C= 500mA	40			
	$h_{FE(6)}$	V_{CE}= 10V, I_C= 10mA,Ta = -55℃	50			
	$h_{FE(7)}$	V_{CE}= 1V, I_C= 150mA	35			
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	
Storage Time	t_s	V_{CC} = 30V, I_C = 150mA, I_{B1} = I_{B2} = 15mA			225	
Fall Time	t_f				60	
Collector output capacitance	C_{ob}	V_{CB}= 10V, I_E= 0,f=1MHz			8	pF
Collector input capacitance	C_{ib}	V_{EB}= 0.5V, I_C= 0,f=1MHz			25	
Noise Figure	NF	V_{CE} = 10V, I_C = 100μA, R_S = 1.0kΩ, f = 1.0kHz			4	dB
Transition frequency	f_T	V_{CE}= 20V, I_C= 20mA,f=100MHz	300			MHz

Note.1:Pulse test: Pulse width ⩽ 300μs, duty cycle ⩽ 2%.

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■ Electrical Characteristics Ta = 25℃(PNP)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector- base breakdown voltage	V_{CBO}	I_C= -100 μA, I_E= 0	-60			V
Collector- emitter breakdown voltage	V_{CEO}	I_C= -10 mA, I_B= 0	-60			
Emitter - base breakdown voltage	V_{EBO}	I_E=-100 μ A, I_C= 0	-5			
Collector-base cut-off current	I_{CBO}	V_{CB}= -50 V , I_E= 0			-10	nA
		V_{CB}= -50 V , I_E= 0,Ta=125℃			-10	uA
Collector- emitter cut-off current	I_{CEX}	V_{CE}= -30 V ,$V_{EB(OFF)}$=-0.5V			-50	nA
Base Cutoff Current	I_{BL}	V_{CE}= -30 V ,$V_{EB(OFF)}$=-0.5V			-50	
Emitter cut-off current	I_{EBO}	V_{EB}= -4V , I_C=0			-10	
Collector-emitter saturation voltage (Note.1)	$V_{CE(sat)}$	I_C=-150 mA, I_B=-15mA			-0.4	V
		I_C=-500 mA, I_B=-50mA			-1.6	
Base - emitter saturation voltage (Note.1)	$V_{BE(sat)}$	I_C=-150 mA, I_B=-15mA			-1.3	
		I_C=-500 mA, I_B=-50mA			-2.6	
DC current gain (Note.1)	$h_{FE(1)}$	V_{CE}= -10V, I_C= -100uA	75			
	$h_{FE(2)}$	V_{CE}= -10V, I_C= -1mA	100			
	$h_{FE(3)}$	V_{CE}= -10V, I_C= -10mA	100			
	$h_{FE(4)}$	V_{CE}= -10V, I_C= -150mA	100		300	
	$h_{FE(5)}$	V_{CE}= -10V, I_C= -500mA	50			
Turn-on Time	t_{on}				45	ns
Delay Time	t_d	V_{CC} = -30V, I_C = -150mA, I_{B1} =- 15mA			10	
Rise Time	t_r				40	
Turn-off Time	t_{off}				100	
Storage Time	t_s	V_{CC} =- 6V, I_C = -150mA, I_{B1} = I_{B2} = -15mA			80	
Fall Time	t_f				30	
Collector output capacitance	C_{ob}	V_{CB}= -10V, I_E= 0,f=1MHz			8	pF
Collector input capacitance	C_{ib}	V_{EB}= -2V, I_C= 0,f=1MHz			30	
Transition frequency	f_T	V_{CE}= -20V, I_C= -50mA,f=100MHz	200			MHz

Note.1: Short duration pulse test used to minimize self-heating effect.

■ Marking

Marking	K27

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■ NPN Typical Characterisitics

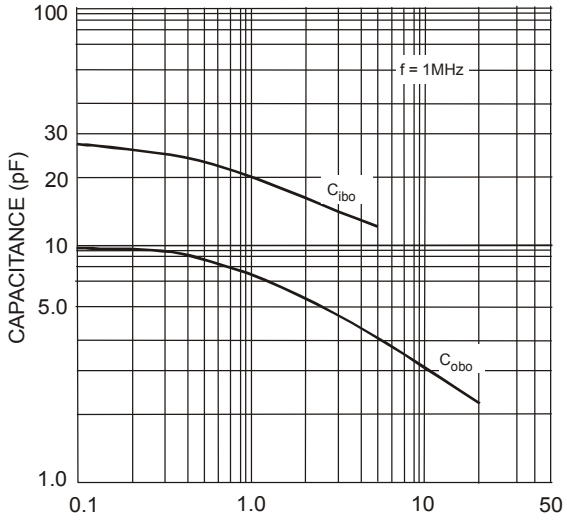

Fig. 1 (2222A) Typical Capacitance

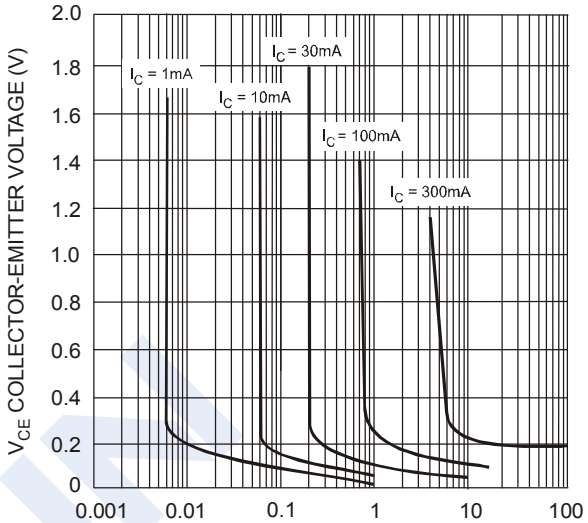

Fig. 2 Typical Collector Saturation Region (2222A Type - NPN)

■ PNP Typical Characterisitics

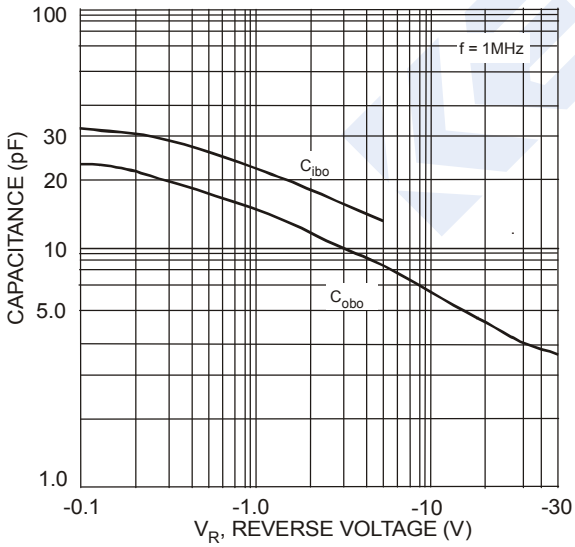

Fig. 3 (2907A) Typical Capacitance

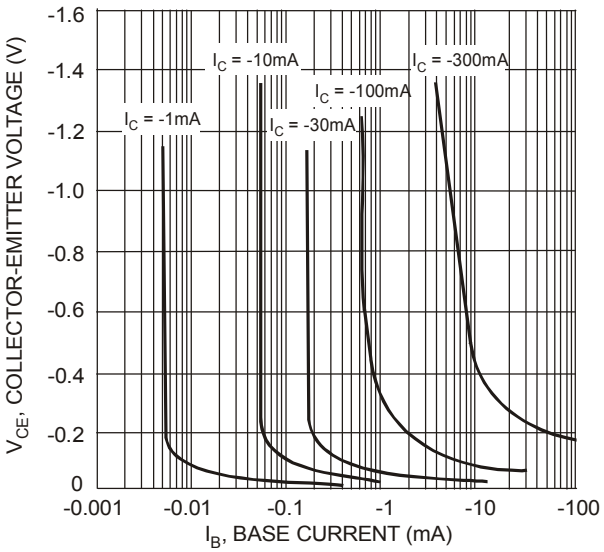

Fig. 4 Typical Collector Saturation Region (2907A Type - PNP)