



JIANGSU CHANGJIANG ELECTRONICS TECHNOLOGY CO., LTD

SOT-363 Plastic-Encapsulate Transistors

MMDT4413 COMPLEMENTARY NPN/PNP TRANSISTOR

FEATURES

Power dissipation

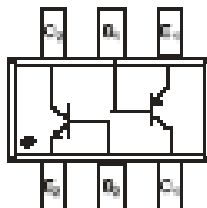
P_{CM} : 0.2 W ($T_{amb}=25^{\circ}C$)

Collector current

I_{CM} : 0.2/-0.2 A

Operating and storage junction temperature range

T_J, T_{stg} : $-55^{\circ}C$ to $+150^{\circ}C$



SOT-363



MAKING: K13

NPN 4401 ELECTRICAL CHARACTERISTICS ($T_{amb}=25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Test conditions	MIN	MAX	UNIT
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 100 \mu A, I_E = 0$	60		V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 1 mA, I_B = 0$	40		V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = 100 \mu A, I_C = 0$	6		V
Collector cut-off current	I_{CBO}	$V_{CB} = 30 V, I_E = 0$		0.1	μA
Collector cut-off current	I_{CEO}	$V_{CE} = 30 V, I_B = 0$		0.1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = 5 V, I_C = 0$		0.1	μA
DC current gain	$h_{FE(1)}$	$V_{CE} = 1 V, I_C = 0.1 mA$	20		
	$h_{FE(2)}$	$V_{CE} = 1 V, I_C = 1 mA$	40		
	$h_{FE(3)}$	$V_{CE} = 1 V, I_C = 10 mA$	80		
	$h_{FE(4)}$	$V_{CE} = 1 V, I_C = 150 mA$	100	300	
	$h_{FE(5)}$	$V_{CE} = 2 V, I_C = 500 mA$	40		
Collector-emitter saturation voltage	$V_{CE(sat)1}$	$I_C = 150 mA, I_B = 15 mA$		0.4	V
	$V_{CE(sat)2}$	$I_C = 500 mA, I_B = 50 mA$		0.75	V
Base-emitter saturation voltage	$V_{BE(sat)1}$	$I_C = 150 mA, I_B = 15 mA$	0.75	0.95	V
	$V_{BE(sat)2}$	$I_C = 500 mA, I_B = 50 mA$		1.2	V
Transition frequency	f_T	$V_{CE} = 10 V, I_C = 20 mA$ $f = 100 MHz$	250		MHz
Output Capacitance	C_{ob}	$V_{CB} = 5 V, I_E = 0$ $f = 1 MHz$		6.5	pF
Delay time	t_d	$V_{CC} = 30 V, V_{BE} = 2.0 V$ $I_C = 150 mA, I_{B1} = 15 mA$		15	nS
Rise time	t_r			20	nS
Storage time	t_s	$V_{CC} = 30 V, I_C = 150 mA$ $I_{B1} = I_{B2} = 15 mA$		225	nS
Fall time	t_f			30	nS

PNP 4403 ELECTRICAL CHARACTERISTICS (T_{amb}=25°C unless otherwise specified)

Parameter	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = -100\mu A$, $I_E = 0$	-40			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = -1mA$, $I_B = 0$	-40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = -100\mu A$, $I_C = 0$	-5			V
Collector cut-off current	I_{CBO}	$V_{CB} = -30V$, $I_E = 0$			-0.1	μA
Collector cut-off current	I_{CEO}	$V_{CE} = -30V$, $I_B = 0$			-0.1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = -5V$, $I_C = 0$			-0.1	μA
DC current gain	$h_{FE(1)}$	$V_{CE} = -1V$, $I_C = -0.1mA$	30			
	$h_{FE(2)}$	$V_{CE} = -1V$, $I_C = -1mA$	60			
	$h_{FE(3)}$	$V_{CE} = -1V$, $I_C = -10mA$	100			
	$h_{FE(4)}$	$V_{CE} = -1V$, $I_C = -150mA$	100		300	
	$h_{FE(5)}$	$V_{CE} = -2V$, $I_C = -500mA$	20			
Collector-emitter saturation voltage	$V_{CE(sat)1}$	$I_C = -150mA$, $I_B = -15mA$			-0.4	V
	$V_{CE(sat)2}$	$I_C = -500mA$, $I_B = -50mA$			-0.75	V
Base-emitter saturation voltage	$V_{BE(sat)1}$	$I_C = -150mA$, $I_B = -15mA$	-0.75		-0.95	V
	$V_{BE(sat)2}$	$I_C = -500mA$, $I_B = -50mA$			-1.3	V
Transition frequency	f_T	$V_{CE} = -10V$, $I_C = -20mA$ $f = 100MHz$	200			MHz
Output Capacitance	C_{ob}	$V_{CB} = -10V$, $I_E = 0$ $f = 1MHz$			8.5	pF
Delay time	t_d	$V_{CC} = -30V$, $V_{BE} = -2V$ $I_C = -150mA$, $I_{B1} = -15mA$			15	nS
Rise time	t_r				20	nS
Storage time	t_s	$V_{CC} = -30V$, $I_C = -150mA$ $I_{B1} = I_{B2} = -15mA$			225	nS
Fall time	t_f				30	nS

Typical Characteristics

MMDT4413

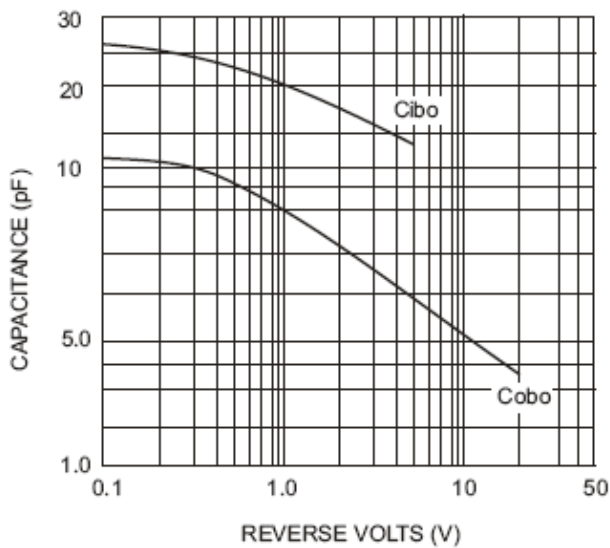


Fig. 1 Typical Capacitance (4401)

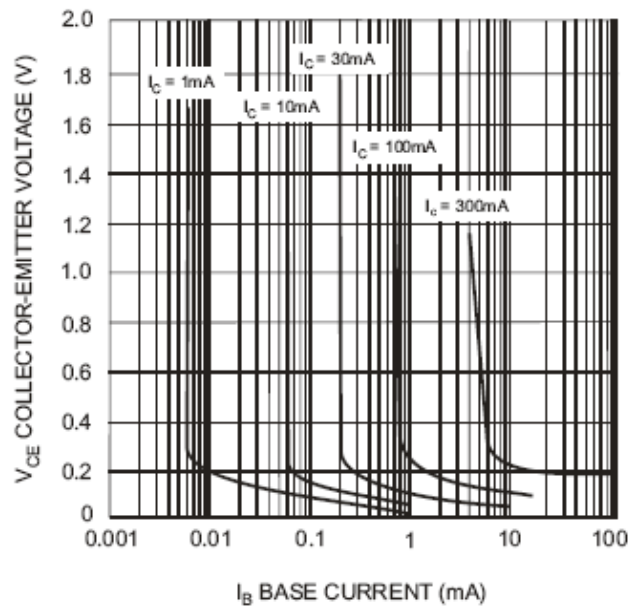


Fig. 2 Typical Collector Saturation Region (4401)

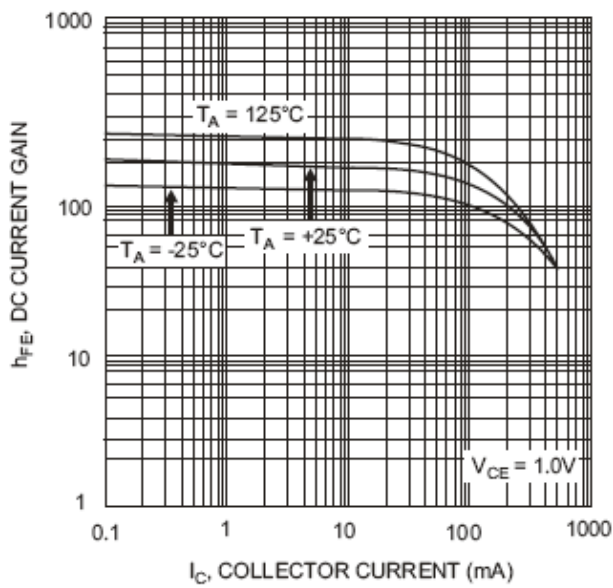


Fig. 3 Typical DC Current Gain vs Collector Current (4401)

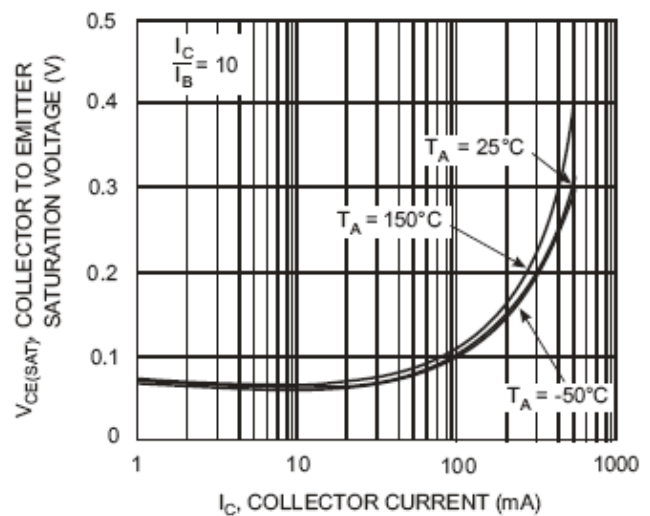


Fig. 4 Collector Emitter Saturation Voltage vs. Collector Current (4401)