

Small Surface Mount Transistor

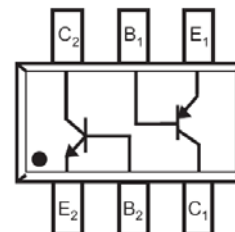
MMDT4413

FEATURES

- Complementary pair.
- Ideal for low power amplification and switching.
- Ultra-Small surface mount package.
- Expitaxial planar die construction.



Lead-free



SOT-363

APPLICATIONS

- General switching and amplification.

ORDERING INFORMATION

Type No.	Marking	Package Code
MMDT4413	K13	SOT-363

MAXIMUM RATING NPN 4401 Section @ Ta=25°C unless otherwise specified

SYMBOL	PARAMETER	VALUE	UNIT
V_{CBO}	collector-base voltage	60	V
V_{CEO}	collector-emitter voltage	40	V
V_{EBO}	emitter-base voltage	6	V
I_C	collector current -continuous	0.6	A
P_D	Power dissipation	0.2	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	625	°C/W
T_J, T_{stg}	Operating and storage junction temperature range	-55 to +150	°C

MAXIMUM RATING PNP 4403 Section @ Ta=25°C unless otherwise specified

SYMBOL	PARAMETER	VALUE	UNIT
V_{CBO}	collector-base voltage	-40	V
V_{CEO}	collector-emitter voltage	-40	V
V_{EBO}	emitter-base voltage	-5.0	V
I_C	collector current -continuous	-0.2	A
P_D	Power dissipation	0.2	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	625	°C/W
T_J, T_{stg}	Operating and storage junction temperature range	-55 to +150	°C



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ELECTRICAL CHARACTERISTICS NPN 4401 Section @ Ta=25°C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	Collector-base breakdown voltage	$I_C=100\mu A, I_E=0$	60		V
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_C=1mA, I_B=0$	40		V
$V_{(BR)EBO}$	Emitter-base breakdown voltage	$I_E=100\mu A, I_C=0$	6		V
I_{CBO}	collector cut-off current	$V_{CB}=30V, I_E=0$	-	100	nA
I_{CEO}	collector cut-off current	$V_{CE}=30V, I_E=0$	-	100	nA
I_{EBO}	emitter cut-off current	$V_{CE}=5V, I_C=0$	-	100	nA
h_{FE}	DC current gain	$V_{CE}=1V, I_C=0.1mA$ $V_{CE}=1V, I_C=1mA$ $V_{CE}=1V, I_C=10mA$ $V_{CE}=1V, I_C=150mA$	20 40 80 100	- - - 300	
$V_{CE(sat)}$	collector-emitter saturation voltage	$I_C=150mA, I_B=15mA$	-	0.4	V
		$I_C=500mA, I_B=50mA$	-	0.75	V
$V_{BE(sat)}$	base-emitter saturation voltage	$I_C=150mA, I_B=15mA$	0.75	0.95	V
		$I_C=500mA, I_B=50mA$	-	1.2	V
C_{ob}	Output capacitance	$I_E=0, V_{CB}=5V; f=1MHz$	-	6.5	pF
f_T	transition frequency	$I_C=20mA, V_{CE}=10V, f=100MHz$	250	-	MHz
t_d	delay time	$V_{CC}=30V, V_{BE}=2.0V$ $I_C=150mA, I_{B1}=I_{B2}=15mA$	-	15	ns
t_r	rise time		-	20	ns
t_s	storage time	$V_{CC}=30V, I_C=150mA$ $I_{B1}=I_{B2}=15mA$	-	225	ns
t_f	fall time		-	30	ns



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ELECTRICAL CHARACTERISTICS PNP 4403 Section @ Ta=25°C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	Collector-base breakdown voltage	$I_C = -100\mu A, I_E = 0$	-40		V
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_C = -1mA, I_B = 0$	-40		V
$V_{(BR)EBO}$	Emitter-base breakdown voltage	$I_E = -100\mu A, I_C = 0$	-5		V
I_{CBO}	collector cut-off current	$I_E = 0, V_{CB} = -30V$	-	-0.1	μA
I_{CEO}	collector cut-off current	$I_E = 0, V_{CE} = -30V$	-	-0.1	μA
I_{EBO}	emitter cut-off current	$I_C = 0, V_{EB} = -5V$	-	-0.1	μA
h_{FE}	DC current gain	$V_{CE} = -1V, I_C = -0.1mA$ $V_{CE} = -1V, I_C = -1mA$ $V_{CE} = -1V, I_C = -10mA$ $V_{CE} = -1V, I_C = -150mA$	30 60 100 100	- - - 300	
$V_{CE(sat)}$	collector-emitter saturation voltage	$I_C = -150mA, I_B = -15mA$	-	-0.4	V
		$I_C = -500mA, I_B = -50mA$	-	-0.75	V
$V_{BE(sat)}$	base-emitter saturation voltage	$I_C = -150mA, I_B = -15mA$	-0.75	-0.95	V
		$I_C = -500mA, I_B = -50mA$	-	-1.3	V
C_{ob}	Output capacitance	$I_E = 0, V_{CB} = -10V; f = 1MHz$	-	8.5	pF
f_T	transition frequency	$I_C = -20mA, V_{CE} = -10V, f = 100MHz$	200	-	MHz
t_d	delay time	$V_{CC} = -30V, V_{BE} = -2V, I_C = -150mA$ $I_{B1} = -15mA$	-	15	ns
t_r	rise time		-	20	ns
t_s	storage time	$V_{CC} = -30V, I_C = -150mA$ $I_{B1} = I_{B2} = -15mA$	-	225	ns
t_f	fall time		-	30	ns

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TYPICAL CHARACTERISTICS @ $T_a=25^\circ\text{C}$ unless otherwise specified

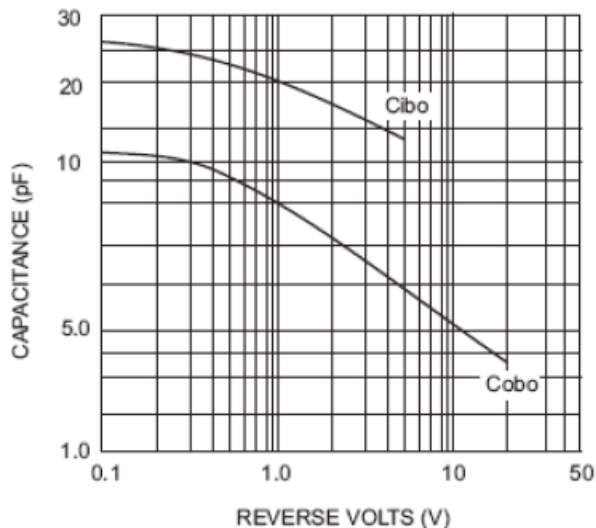


Fig. 1 Typical Capacitance (4401)

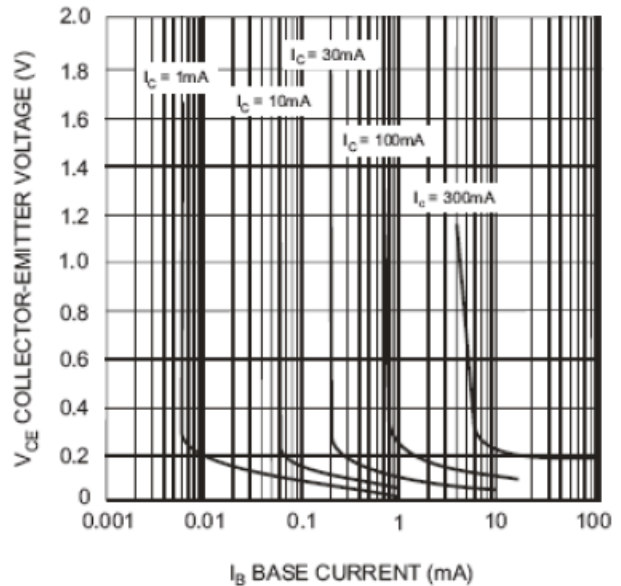


Fig. 2 Typical Collector Saturation Region (4401)

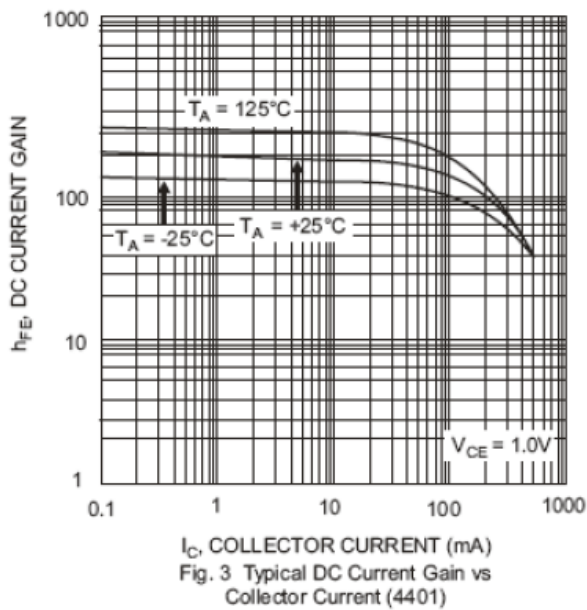


Fig. 3 Typical DC Current Gain vs Collector Current (4401)

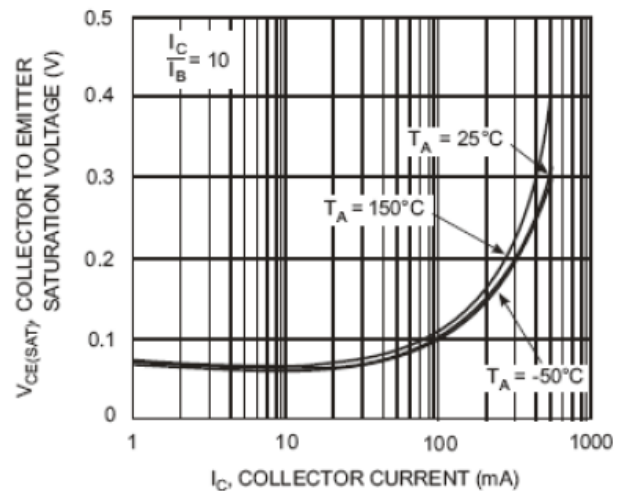


Fig. 4 Collector Emitter Saturation Voltage vs. Collector Current (4401)

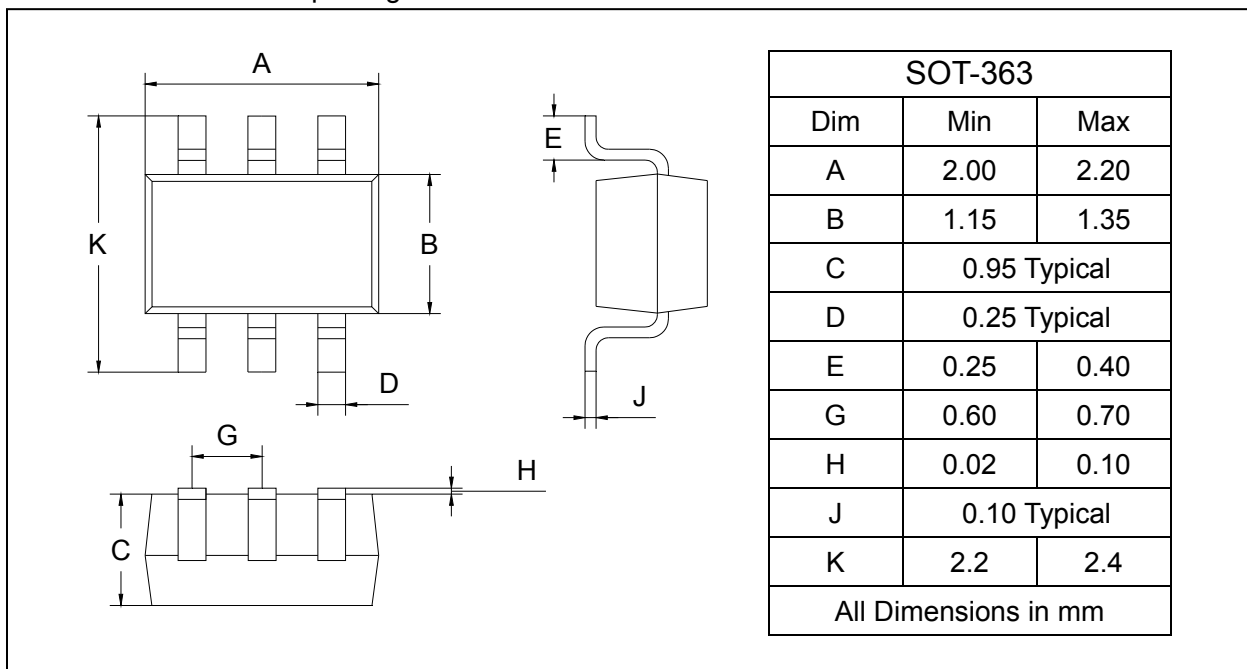
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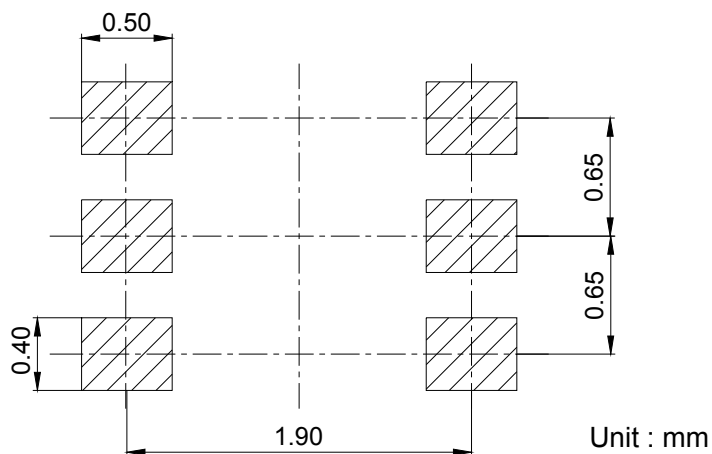
PACKAGE OUTLINE

Plastic surface mounted package

SOT-363



SOLDERING FOOTPRINT



PACKAGE INFORMATION

Device	Package	Shipping
MMDT4413	SOT-363	3000/Tape&Reel