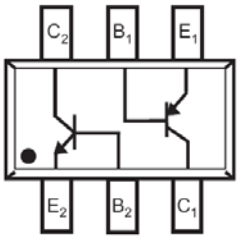
Small Signal Surface Mount Transistor MMDT4413

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℃ 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	0.2	A
P_D	Power dissipation	0.2	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	625	℃/W
T_J, T_{stg}	Operating and storage junction temperature range	-55-150	℃

MAXIMUM RATING PNP 4403 Section @ Ta=25℃ 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	℃/W
T_J, T_{stg}	Operating and storage junction temperature range	-55-150	℃

Small Signal Surface Mount Transistor MMDT4413

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	Collector-base breakdown voltage	I_C=100μA,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=100μA,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 V_{CE}=1V,I_C=500mA	20 40 80 100 40	- - - 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

Small Signal Surface Mount Transistor MMDT4413

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	Collector-base breakdown voltage	I_C=-100μA,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=-100μA,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 V_{CE} =-1V,I_C =-500mA	30 60 100 100 20	- - - 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

Small Signal Surface Mount Transistor MMDT4413

TYPICAL CHARACTERISTICS @ Ta=25℃ unless otherwise specified

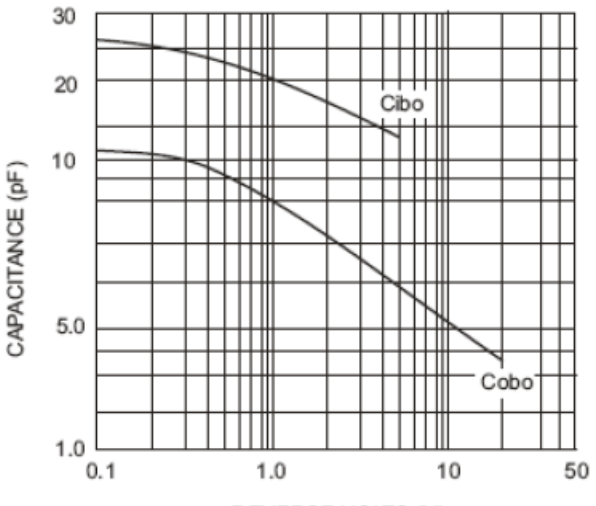


Fig. 1 Typical Capacitance (4401)

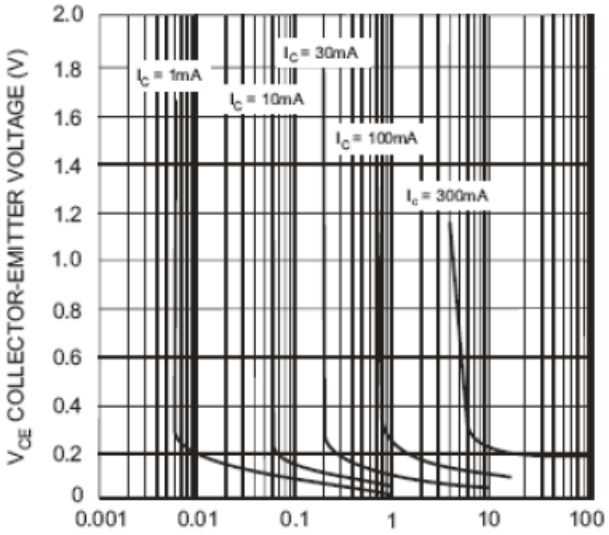


Fig. 2 Typical Collector Saturation Region (4401)

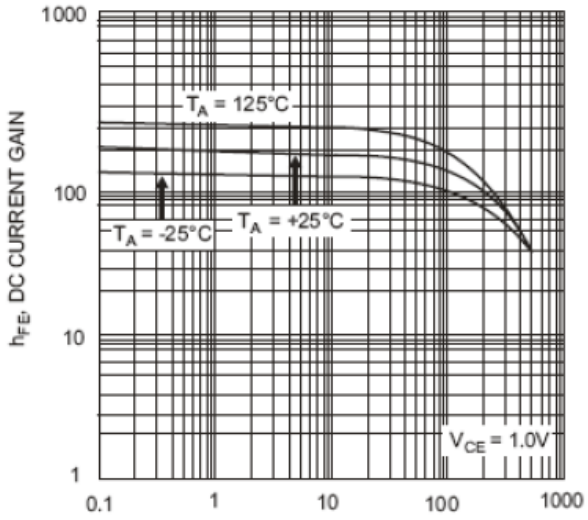


Fig. 3 Typical DC Current Gain vs Collector Current (4401)

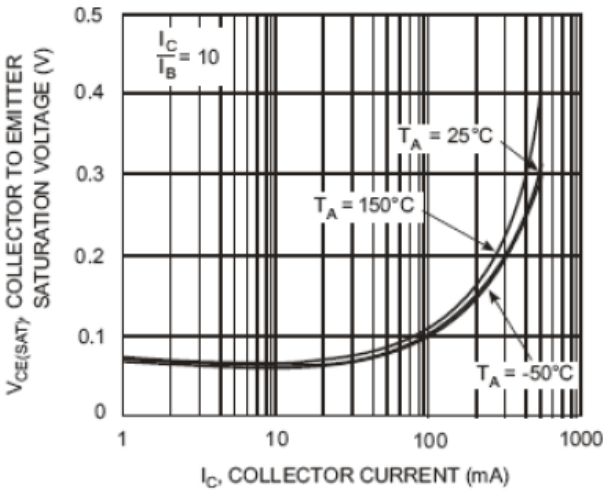
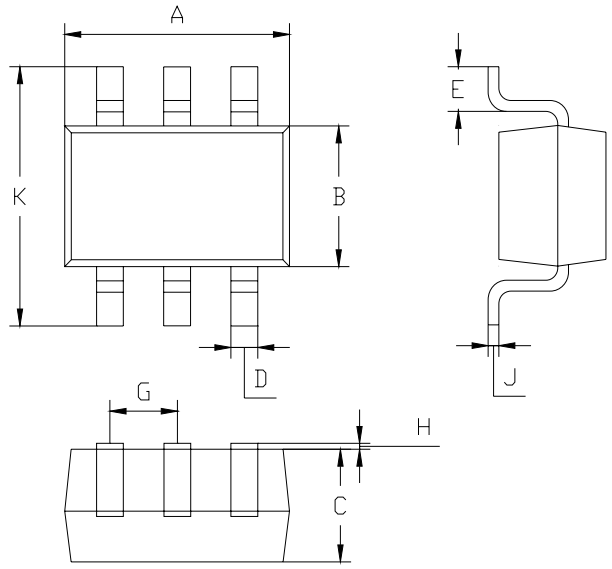


Fig. 4 Collector Emitter Saturation Voltage vs. Collector Current (4401)

Small Signal Surface Mount Transistor MMDT4413

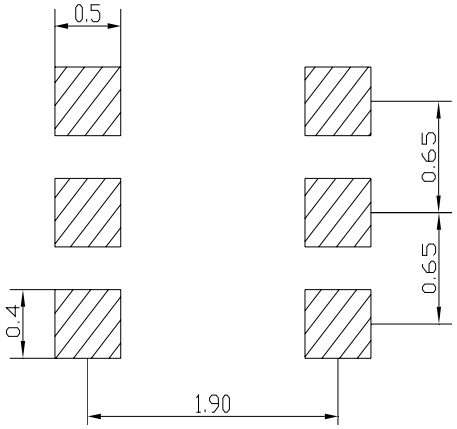
PACKAGE OUTLINE

Plastic surface mounted package SOT-363



SOT-363		
Dim	Min	Max
A	1.8	2.2
B	1.15	1.35
C	1.0Typical	
D	0.10	0.30
E	0.25	0.40
G	0.65Typical	
H	0.02	0.10
J	0.1Typical	
K	2.1	2.3
All Dimensions in mm		

SOLDERING FOOTPRINT



Unit : mm

PACKAGE INFORMATION

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