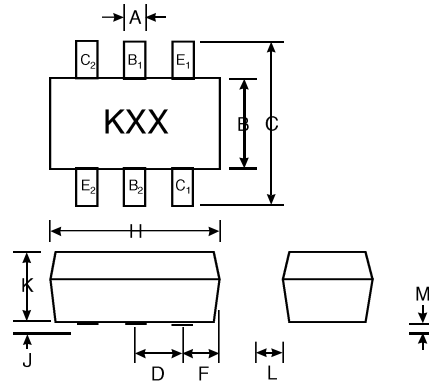


## COMPLEMENTARY NPN / PNP SMALL SIGNAL SURFACE MOUNT TRANSISTOR

### Features

Complementary Pair  
 One 4401-Type NPN,  
 One 4403-Type PNP  
 Epitaxial Planar Die Construction  
 Ideal for Low Power Amplification and  
 Switching  
 Ultra-Small Surface Mount Package



SOT-363		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Nominal	
F	0.30	0.40
H	1.80	2.20
J		0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.25
All Dimensions in mm		

### Mechanical Data

Case: SOT-363, Molded Plastic  
 Terminals: Solderable per MIL-STD-202,  
 Method 208  
 Terminal Connections: See Diagram  
 Marking: K13  
 Weight: 0.006 grams (approx.)

Note: E1, B1, and C1 = PNP 4403 Section,  
 E2, B2, and C2 = NPN 4401 Section.  
 Type marking indicates orientation.

### Maximum Ratings, NPN 4401 Section

@ T<sub>A</sub> = 25 C unless otherwise specified

Characteristic	Symbol		Unit
Collector-Base Voltage	V <sub>CB0</sub>	60	V
Collector-Emitter Voltage	V <sub>CE0</sub>	40	V
Emitter-Base Voltage	V <sub>EBO</sub>	6.0	V
Collector Current - Continuous (Note 1)	I <sub>C</sub>	600	mA
Power Dissipation (Note 1)	P <sub>d</sub>	200	mW
Thermal Resistance, Junction to Ambient (Note 1)	R <sub>JA</sub>	625	K/W
Operating and Storage and Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	C

### Maximum Ratings, PNP 4403 Section

@ T<sub>A</sub> = 25 C unless otherwise specified

Characteristic	Symbol		Unit
Collector-Base Voltage	V <sub>CB0</sub>	-40	V
Collector-Emitter Voltage	V <sub>CE0</sub>	-40	V
Emitter-Base Voltage	V <sub>EBO</sub>	-5.0	V
Collector Current - Continuous (Note 1)	I <sub>C</sub>	-600	mA
Power Dissipation (Note 1)	P <sub>d</sub>	200	mW
Thermal Resistance, Junction to Ambient (Note 1)	R <sub>JA</sub>	625	K/W
Operating and Storage and Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	C

Notes: 1. Valid provided that terminals are kept at ambient temperature.

Electrical Characteristics, NPN 4401 Section

@ T<sub>A</sub> = 25 C unless otherwise specified

[查询"MMDT4413-7E"供应商](#)

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 2)					
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	60		V	I <sub>C</sub> = 100 A, I <sub>E</sub> = 0
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	40		V	I <sub>C</sub> = 1.0mA, I <sub>B</sub> = 0
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	6.0		V	I <sub>E</sub> = 100 A, I <sub>C</sub> = 0
Collector Cutoff Current	I <sub>CEX</sub>		100	nA	V <sub>CE</sub> = 35V, V <sub>EB(OFF)</sub> = 0.4V
Base Cutoff Current	I <sub>BL</sub>		100	nA	V <sub>CE</sub> = 35V, V <sub>EB(OFF)</sub> = 0.4V
ON CHARACTERISTICS (Note 2)					
DC Current Gain	h <sub>FE</sub>	20 40 80 100 40	300		I <sub>C</sub> = 100μA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 1.0mA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 10mA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 150mA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 500mA, V <sub>CE</sub> = 2.0V
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>		0.40 0.75	V	I <sub>C</sub> = 150mA, I <sub>B</sub> = 15mA I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA
Base- Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	0.75	0.95 1.2	V	I <sub>C</sub> = 150mA, I <sub>B</sub> = 15mA I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C <sub>cb</sub>		6.5	pF	V <sub>CB</sub> = 5.0V, f = 1.0MHz, I <sub>E</sub> = 0
Input Capacitance	C <sub>eb</sub>		30	pF	V <sub>EB</sub> = 0.5V, f = 1.0MHz, I <sub>C</sub> = 0
Input Impedance	h <sub>ie</sub>	1.0	15	k	V <sub>CE</sub> = 10V, I <sub>C</sub> = 1.0mA, f = 1.0kHz
Voltage Feedback Ratio	h <sub>re</sub>	0.1	8.0	x 10 <sup>-4</sup>	
Small Signal Current Gain	h <sub>fe</sub>	40	500		
Output Admittance	h <sub>oe</sub>	1.0	30	S	
Current Gain-Bandwidth Product	f <sub>T</sub>	250		MHz	
SWITCHING CHARACTERISTICS					
Delay Time	t <sub>d</sub>		15	ns	V <sub>CC</sub> = 30V, I <sub>C</sub> = 150mA, V <sub>BE(off)</sub> = 2.0V, I <sub>B1</sub> = 15mA
Rise Time	t <sub>r</sub>		20	ns	
Storage Time	t <sub>s</sub>		225	ns	V <sub>CC</sub> = 30V, I <sub>C</sub> = 150mA, I <sub>B1</sub> = I <sub>B2</sub> = 15mA
Fall Time	t <sub>f</sub>		30	ns	

- Notes: 1. Valid provided that terminals are kept at ambient temperature.  
2. Pulse test: Pulse width 300 s, duty cycle 2%.

## Electrical Characteristics, PNP 4403 Section

@ T<sub>A</sub> = 25 C unless otherwise specified[查询"MMDT4413-7E"供应商](#)

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 2)					
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	-40		V	I <sub>C</sub> = -100 A, I <sub>E</sub> = 0
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	-40		V	I <sub>C</sub> = -1.0mA, I <sub>B</sub> = 0
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	-5.0		V	I <sub>E</sub> = -100 A, I <sub>C</sub> = 0
Collector Cutoff Current	I <sub>CEX</sub>		-100	nA	V <sub>CE</sub> = -35V, V <sub>EB(OFF)</sub> = -0.4V
Base Cutoff Current	I <sub>BL</sub>		-100	nA	V <sub>CE</sub> = -35V, V <sub>EB(OFF)</sub> = -0.4V
ON CHARACTERISTICS (Note 2)					
DC Current Gain	h <sub>FE</sub>	30 60 100 100 20	300		I <sub>C</sub> = -100μA, V <sub>CE</sub> = -1.0V I <sub>C</sub> = -1.0mA, V <sub>CE</sub> = -1.0V I <sub>C</sub> = -10mA, V <sub>CE</sub> = -1.0V I <sub>C</sub> = -150mA, V <sub>CE</sub> = -2.0V I <sub>C</sub> = -500mA, V <sub>CE</sub> = -2.0V
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>		-0.40 -0.75	V	I <sub>C</sub> = -150mA, I <sub>B</sub> = -15mA I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA
Base- Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	-0.75	-0.95 -1.30	V	I <sub>C</sub> = -150mA, I <sub>B</sub> = -15mA I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C <sub>cb</sub>		8.5	pF	V <sub>CB</sub> = -10V, f = 1.0MHz, I <sub>E</sub> = 0
Input Capacitance	C <sub>eb</sub>		30	pF	V <sub>EB</sub> = -0.5V, f = 1.0MHz, I <sub>C</sub> = 0
Input Impedance	h <sub>ie</sub>	1.5	15	k	V <sub>CE</sub> = -10V, I <sub>C</sub> = -1.0mA, f = 1.0kHz
Voltage Feedback Ratio	h <sub>re</sub>	0.1	8.0	x 10 <sup>-4</sup>	
Small Signal Current Gain	h <sub>fe</sub>	60	500		
Output Admittance	h <sub>oe</sub>	1.0	100	S	
Current Gain-Bandwidth Product	f <sub>T</sub>	200		MHz	
SWITCHING CHARACTERISTICS					
Delay Time	t <sub>d</sub>		15	ns	V <sub>CC</sub> = -30V, I <sub>C</sub> = -150mA, V <sub>BE(off)</sub> = -2.0V, I <sub>B1</sub> = -15mA
Rise Time	t <sub>r</sub>		20	ns	
Storage Time	t <sub>s</sub>		225	ns	V <sub>CC</sub> = -30V, I <sub>C</sub> = -150mA, I <sub>B1</sub> = I <sub>B2</sub> = -15mA
Fall Time	t <sub>f</sub>		30	ns	

- Notes: 1. Valid provided that terminals are kept at ambient temperature.  
2. Pulse test: Pulse width 300 s, duty cycle 2%.