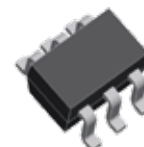
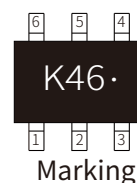


FEATURES

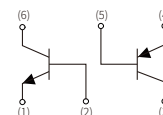
- Complementary Pair
- Epitaxial Planar Die Construction
- Ideal for low Power Amplification and Switching
- One 3904(NPN), one 3906(PNP)



SOT-363



Marking



Schematic Symbol

MECHANICAL DATA

- SOT-363 small outline plastic package
- Epoxy UL: 94V-0
- Mounting position: Any

APPROVALS

RoHS	Compliance with 2011/65/EU
HF	Compliance with IEC61249-2-21:2003

MAXIMUM RATINGS ($T_A=25^{\circ}\text{C}$)

Parameter	Symbol	Value		Unit
		(NPN)5551	(PNP)3906	
Collector-Base Voltage	V_{CBO}	60	-40	V
Collector-Emitter Voltage	V_{CEO}	40	-40	
Emitter-Base Voltage	V_{EBO}	5	-5	
Collector Current	I_C	200	-200	mA
Collector Power Dissipation	P_C	200	200	mW
Thermal Resistance From Junction To Ambient	$R_{\theta JA}$	625	625	$^{\circ}\text{C}/\text{W}$
Junction Temperature	T_J	150	150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55~+150	-55~+150	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS (T_A=25°C)

(NPN)3904

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C=10\mu A, I_E=0$	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C=1mA, I_B=0$	40			
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=10\mu A, I_C=0$	5			
Collector cut-off current	I_{CBO}	$V_{CB}=30V, I_E=0$			50	nA
Collector cut-off current	I_{CEO}	$V_{CE}=30V, I_B=0$			500	
Emitter cut-off current	I_{EBO}	$V_{EB}=5V, I_C=0$			50	
DC current gain	$h_{FE(1)}$	$V_{CE}=1V, I_C=0.1mA$	40			
	$h_{FE(2)}$	$V_{CE}=1V, I_C=1mA$	70			
	$h_{FE(3)}$	$V_{CE}=1V, I_C=10mA$	100		300	
	$h_{FE(4)}$	$V_{CE}=1V, I_C=50mA$	60			
	$h_{FE(5)}$	$V_{CE}=1V, I_C=100mA$	30			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=10mA, I_B=1mA$			0.2	V
	$V_{CE(sat)}$	$I_C=50mA, I_B=5mA$			0.3	
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C=10mA, I_B=1mA$	0.65		0.85	
	$V_{BE(sat)}$	$I_C=50mA, I_B=5mA$			0.95	
Transition frequency	f_T	$V_{CE}=20V, I_C=20mA, f=100MHz$	300			MHz
Collector output capacitance	C_{ob}	$V_{CB}=5V, I_E=0, f=1MHz$			4.0	pF
Noise figure	N_F	$V_{CE}=5V, I_C=0.1mA, f=1kHz, R_B=1K\Omega, \Delta f=200MHz$			5.0	dB
Delay time	t_d	$V_{CC}=3V, V_{BE(off)}=0.5V, I_C=10mA, I_{B1}=1mA$			35	nS
Rise time	t_r				35	
Storage time	t_s	$V_{CC}=3V, I_C=10mA, I_{B1}=I_{B2}=1mA$			200	
Fall time	t_f				50	

*Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2.0\%$.

ELECTRICAL CHARACTERISTICS (T_A=25°C)

(PNP)3906

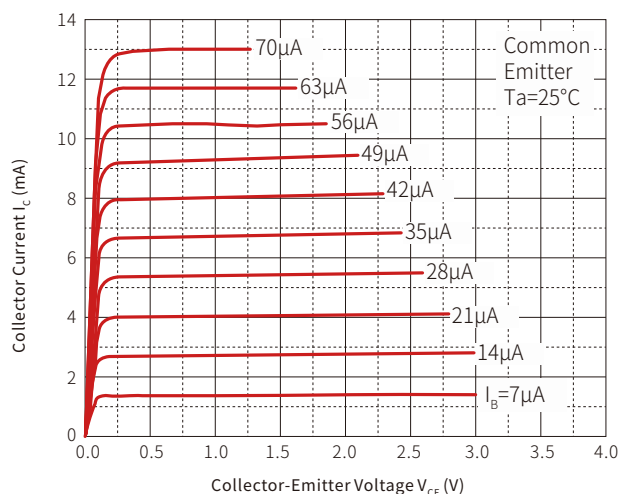
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = -10\mu A, I_E = 0$	-40			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = -1mA, I_B = 0$	-40			
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = -10\mu A, I_C = 0$	-5			
Collector cut-off current	I_{CBO}	$V_{CB} = -30V, I_E = 0$			-50	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = -5V, I_C = 0$			-50	
DC current gain	$h_{FE(1)}$	$V_{CE} = -1V, I_C = -0.1mA$	60			
	$h_{FE(2)}$	$V_{CE} = -1V, I_C = -1mA$	80			
	$h_{FE(3)}$	$V_{CE} = -1V, I_C = -10mA$	100		300	
	$h_{FE(4)}$	$V_{CE} = -1V, I_C = -50mA$	60			
	$h_{FE(5)}$	$V_{CE} = -1V, I_C = -100mA$	30			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -10mA, I_B = -1mA$			-0.25	V
	$V_{CE(sat)}$	$I_C = -50mA, I_B = -5mA$			-0.40	
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = -10mA, I_B = -1mA$	-0.65		-0.85	
	$V_{BE(sat)}$	$I_C = -50mA, I_B = -5mA$			-0.95	
Transition frequency	f_T	$V_{CE} = -20V, I_C = -10mA, f = 100MHz$	250			MHz
Collector output capacitance	C_{ob}	$V_{CB} = -5V, I_E = 0, f = 1MHz$			4.5	pF
Noise figure	N_F	$V_{CE} = -5V, I_C = -0.1mA, f = 1kHz, R_g = 1k\Omega, \Delta f = 200MHz$			4.0	dB
Delay time	t_d	$V_{CC} = -3V, V_{BE(off)} = -0.5V, I_C = -10mA, I_{B1} = -1mA$			35	nS
Rise time	t_r				35	
Storage time	t_s	$V_{CC} = -3V, I_C = -10mA, I_{B1} = I_{B2} = -1mA$			225	
Fall time	t_f				75	

*Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2.0\%$.

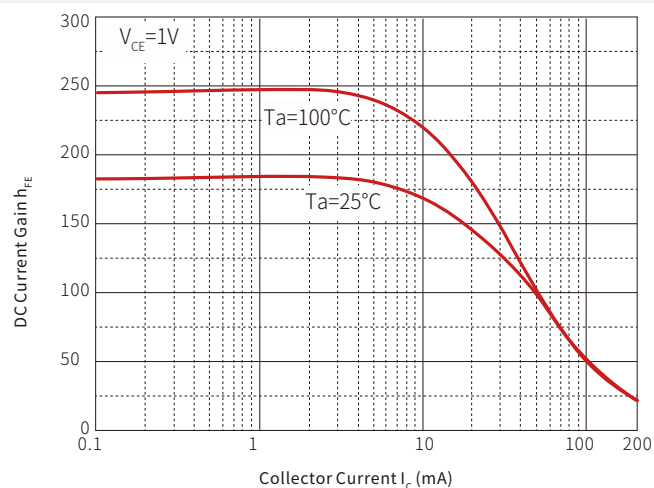
TYPICAL CHARACTERISTICS

(NPN)3904

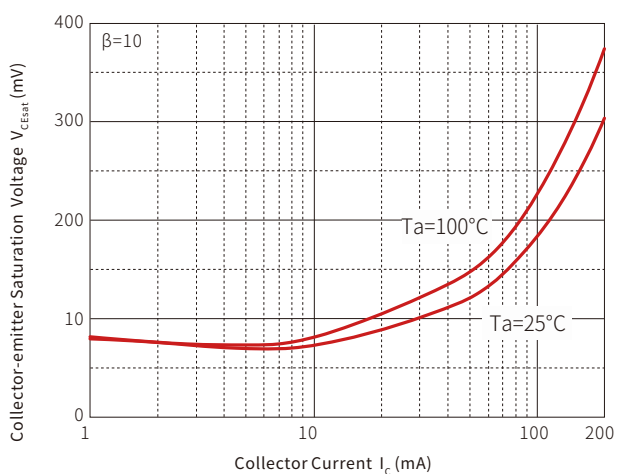
Static Characteristic



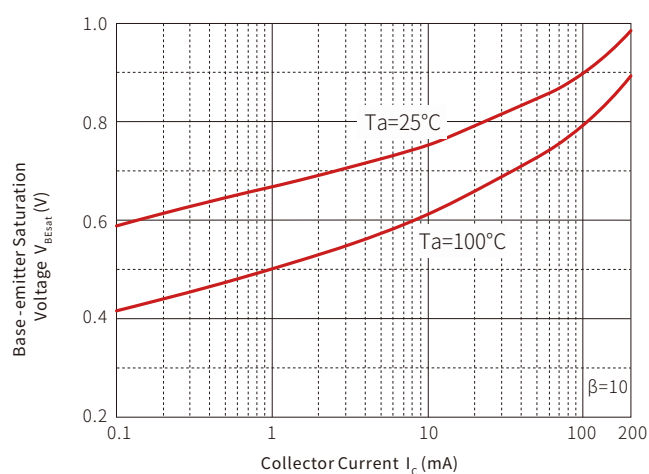
h_{FE} — I_c

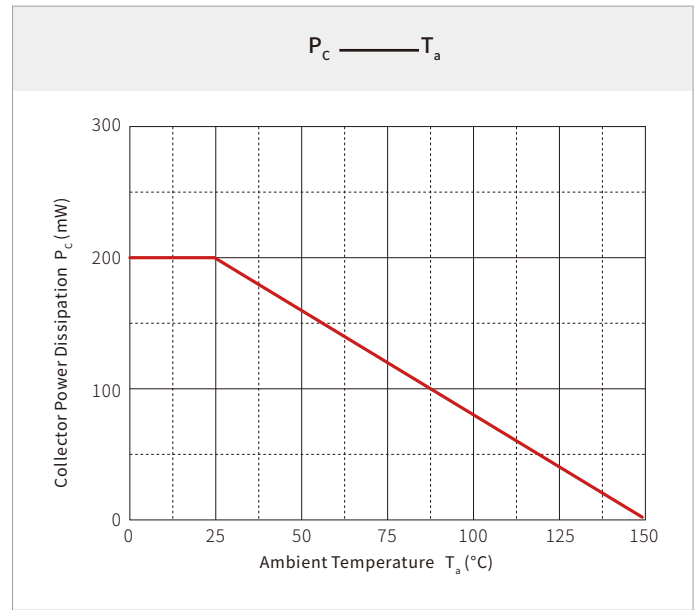
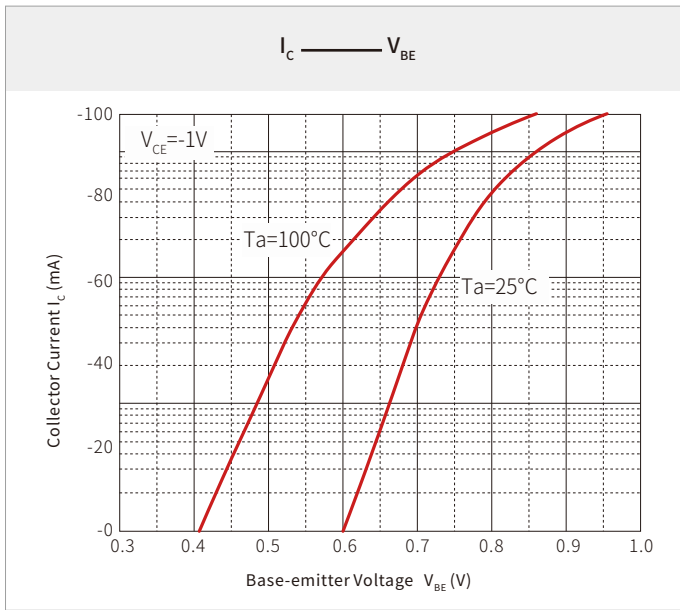


$V_{CE sat}$ — I_c

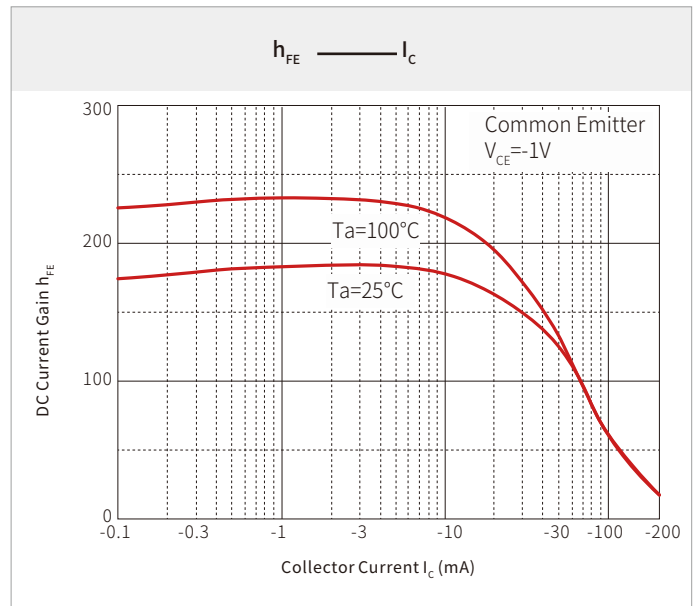
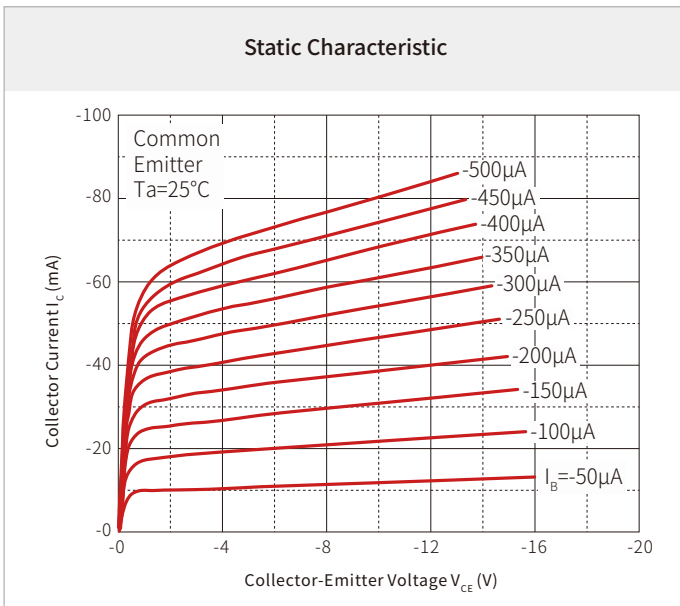


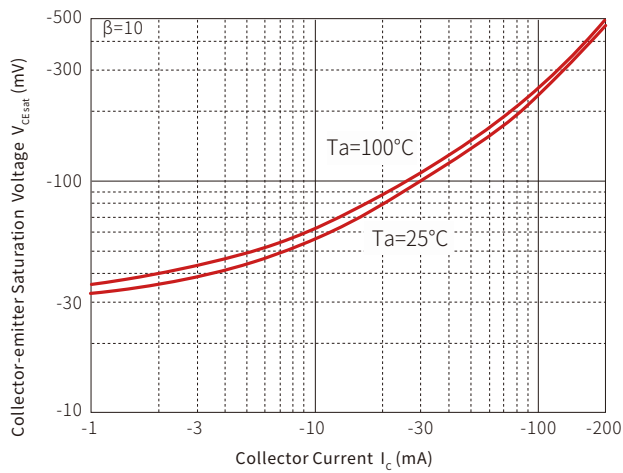
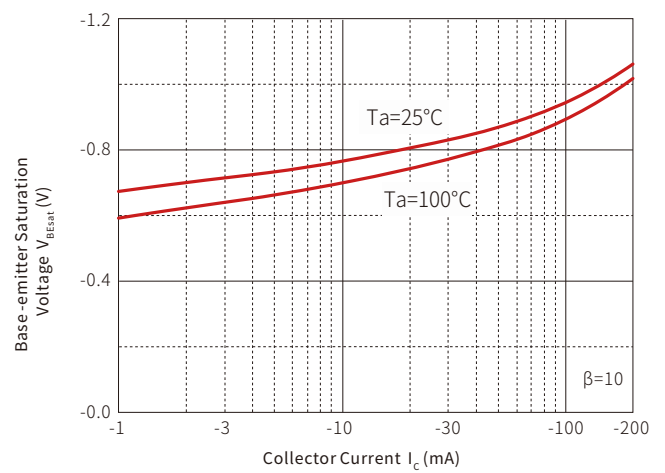
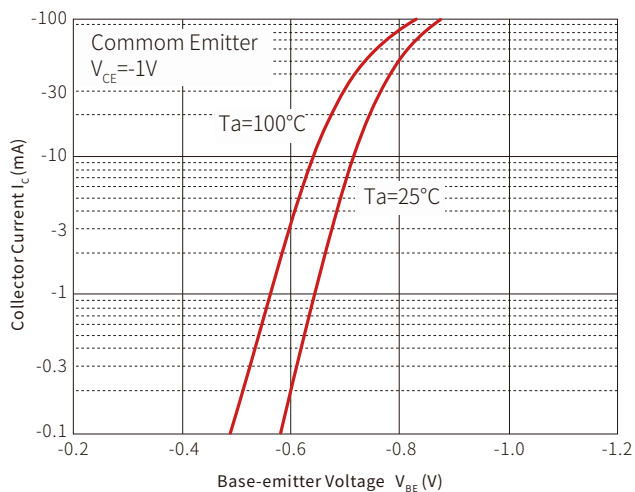
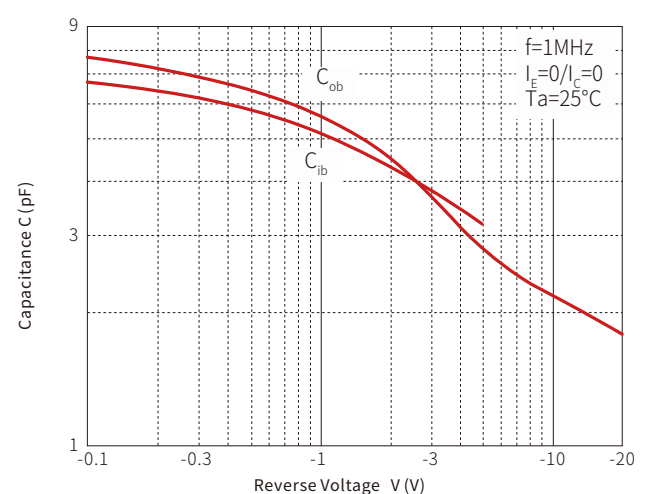
$V_{BE sat}$ — I_c

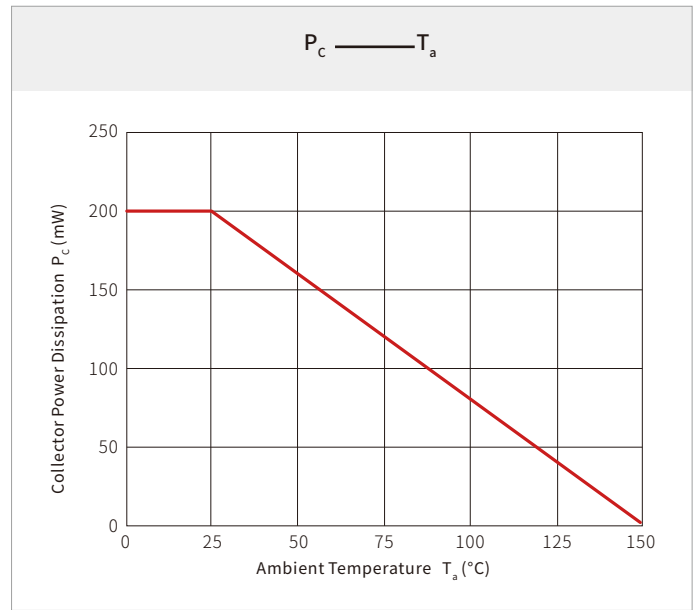
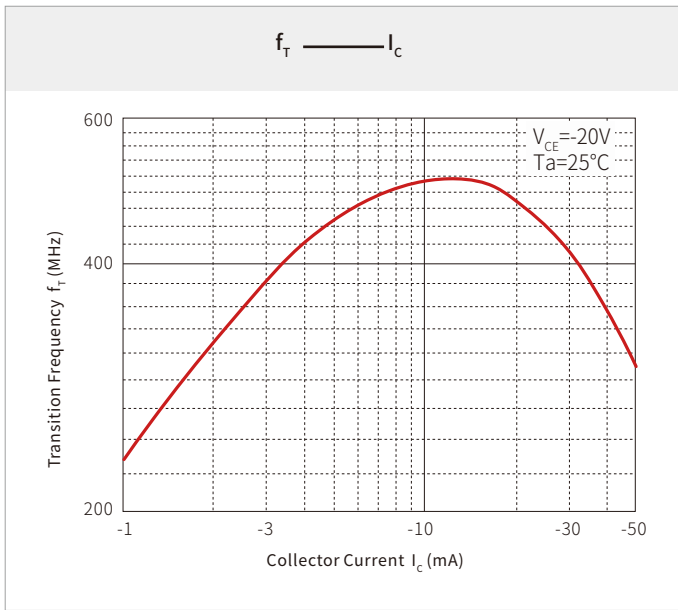




(PNP)3906

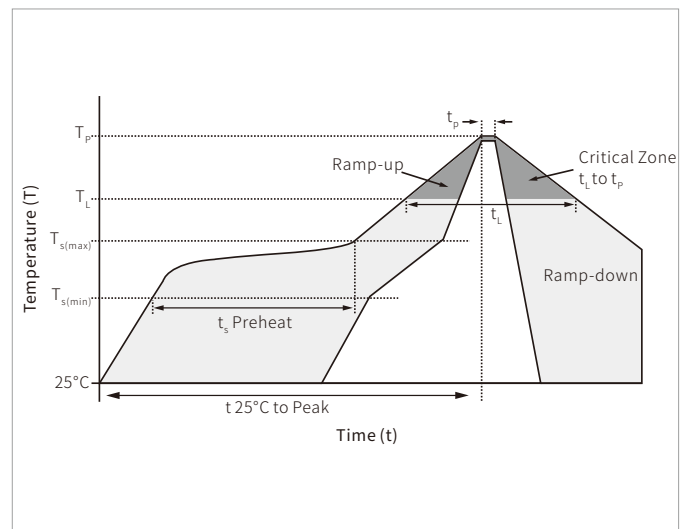


 $V_{CE\ sat} \text{ — } I_C$  $V_{BE\ sat} \text{ — } I_C$  $I_C \text{ — } V_{BE}$  $C_{ob}/C_{ib} \text{ — } V_{CB}/V_{EB}$ 

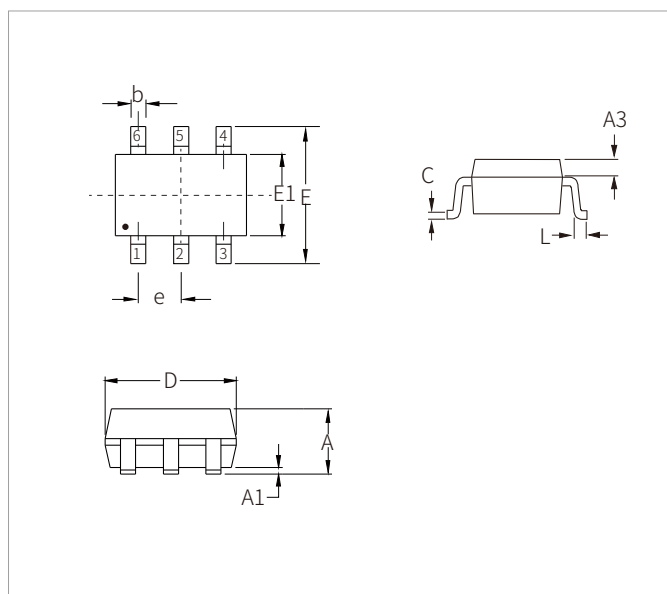


SOLDERING PARAMETERS

Reflow Condition		Lead-free assembly
Pre Heat	Temperature Max ($T_{s(min)}$)	150 $^\circ C$
	Temperature Max ($T_{s(max)}$)	200 $^\circ C$
	Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus Temp (T_L) to peak)		3 $^\circ C$ /second max
$T_{s(max)}$ to T_L - Ramp-up Rate		3 $^\circ C$ /second max
Reflow	Temperature (T_L) (Liquidus)	217 $^\circ C$
	Time (min to max) (t_L)	60 – 150 seconds
Peak Temperature (T_p)		260 $^\circ C$
Time within 5 $^\circ C$ of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		6 $^\circ C$ /second max
Time 25 $^\circ C$ to peak Temperature (T_p)		8 minutes max.
Do not exceed		260 $^\circ C$

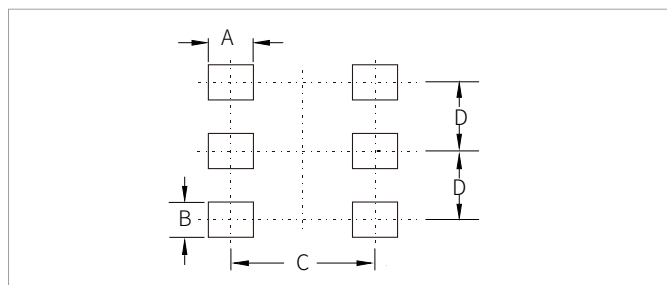


SOT-363 PACKAGE INFORMATION



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A3	0.20REF		0.008REF	
D	1.800	2.200	0.070	0.086
E1	1.150	1.350	0.045	0.053
E	2.000	2.200	0.078	0.086
e	0.65BSC		0.026BSC	
b	0.100	0.300	0.004	0.012
L	0.100	0.300	0.004	0.012
C	0.100	0.250	0.004	0.010

RECOMMENDED PAD LAYOUT DIMENSIONS



Ref.	Millimeters	Inches
A	0.50	0.0197
B	0.40	0.0157
C	1.90	0.0748
D	0.65	0.0250

ORDERING INFORMATION

Part Number	Component Package	QTY/Reel	Reel Size
MMDT3946	SOT-363	3000PCS	7"

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201000

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