Absolute Maximum Ratings - NPN (Q1) (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6.0	V
Collector Current	I_C	200	mA

Absolute Maximum Ratings - PNP (Q2) (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-5.0	V
Collector Current	I_C	-200	mA

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	300	mW
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	417	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Note: 5. Device mounted on FR-4 PCB with minimum recommended pad layout.

ESD Rating (Note 6)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	200	V	B

Note: 6. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

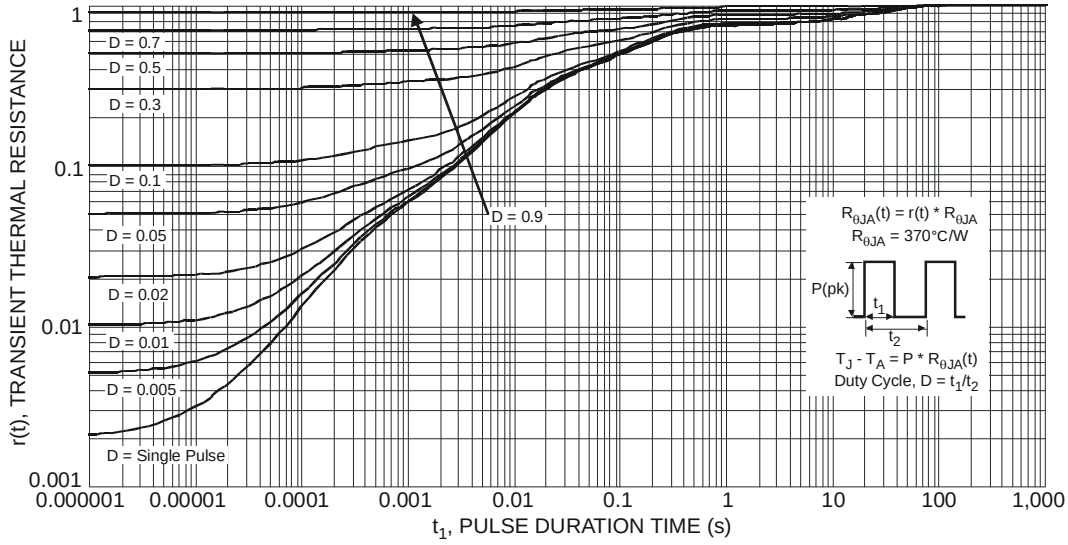


Fig. 1 Transient Thermal Response

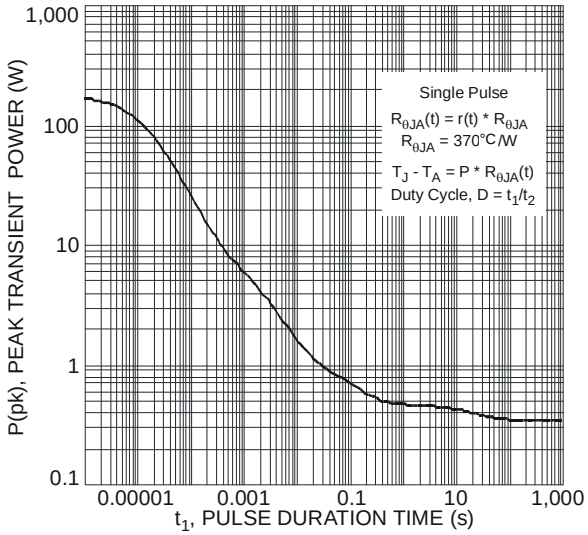


Fig. 2 Single Pulse Maximum Power Dissipation

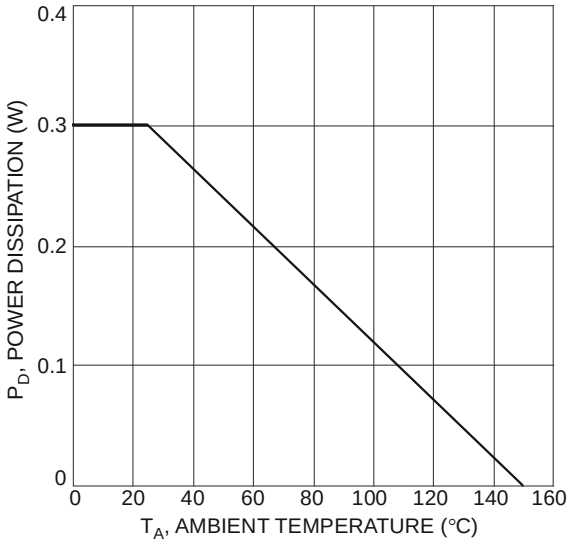


Fig. 3 Power Dissipation vs. Ambient Temperature

Electrical Characteristics - NPN (Q1) (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)					
Collector-Base Breakdown Voltage	BV_{CBO}	60	—	V	I_C = 10µA, I_E = 0
Collector-Emitter Breakdown Voltage (Note 7)	BV_{CEO}	40	—	V	I_C = 1.0mA, I_B = 0
Emitter-Base Breakdown Voltage	BV_{EBO}	6.0	—	V	I_E = 10µA, I_C = 0
Collector Cutoff Current	I_{CEX}	—	50	nA	V_{CE} = 30V, $V_{EB(OFF)}$ = 3.0V
Base Cutoff Current	I_{BL}	—	50	nA	V_{CE} = 30V, $V_{EB(OFF)}$ = 3.0V
ON CHARACTERISTICS (Note 7)					
DC Current Gain	h_{FE}	40 70 100 60 30	— — 300 — —	—	I_C = 100µA, V_{CE} = 1.0V I_C = 1.0mA, V_{CE} = 1.0V I_C = 10mA, V_{CE} = 1.0V I_C = 50mA, V_{CE} = 1.0V I_C = 100mA, V_{CE} = 1.0V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	0.20 0.30	V	I_C = 10mA, I_B = 1.0mA I_C = 50mA, I_B = 5.0mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	0.65 —	0.85 0.95	V	I_C = 10mA, I_B = 1.0mA I_C = 50mA, I_B = 5.0mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{OBO}	—	4.0	pF	V_{CB} = 5.0V, f = 1.0MHz, I_E = 0
Input Capacitance	C_{IBO}	—	8.5	pF	V_{EB} = 0.5V, f = 1.0MHz, I_C = 0
Input Impedance	h_{IE}	1.0	10	kΩ	V_{CE} = 10V, I_C = 1.0mA, f = 1.0kHz
Voltage Feedback Ratio	h_{RE}	0.5	8.0	x 10^{-4}	
Small Signal Current Gain	h_{FE}	100	400	—	
Output Admittance	h_{OE}	1.0	40	µs	
Current Gain-Bandwidth Product	f_T	300	—	MHz	V_{CE} = 20V, I_C = 10mA, f = 100MHz
SWITCHING CHARACTERISTICS					
Delay Time	t_D	—	35	ns	V_{CC} = 3.0V, I_C = 10mA, $V_{BE(OFF)}$ = - 0.5V, I_{B1} = 1.0mA
Rise Time	t_R	—	35	ns	
Storage Time	t_S	—	200	ns	V_{CC} = 3.0V, I_C = 10mA, I_{B1} = -I_{B2} = 1.0mA
Fall Time	t_F	—	50	ns	

Note: 7. Short duration pulse test used to minimize self-heating effect.

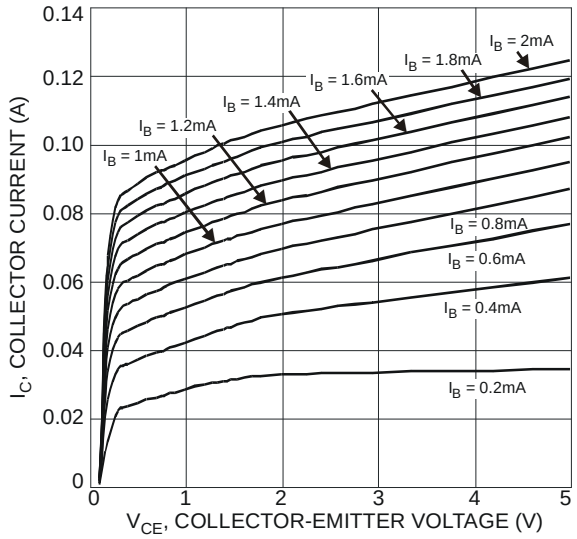


Fig. 4 Typical Collector Current vs. Collector-Emitter Voltage

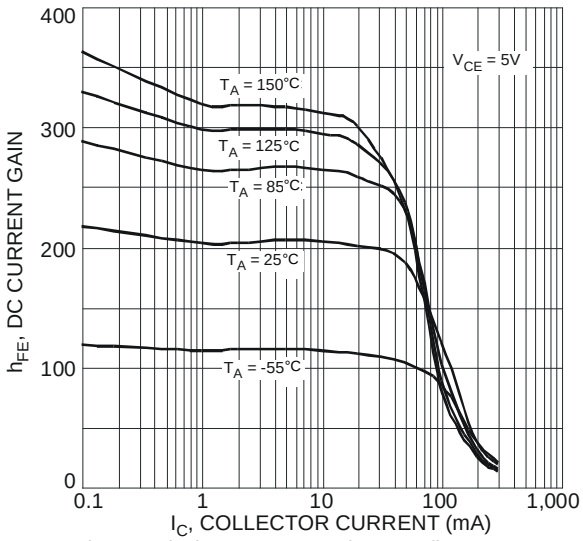


Fig. 5 Typical DC Current Gain vs. Collector Current

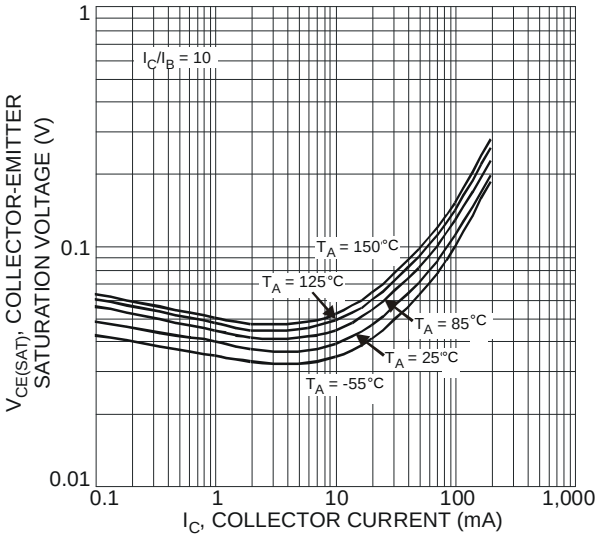


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

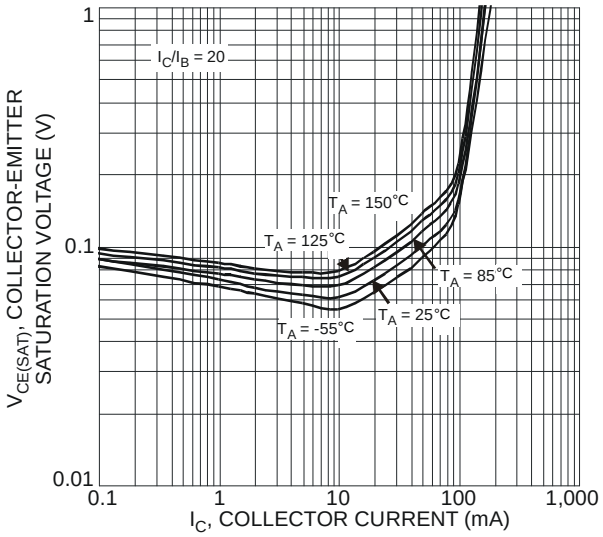


Fig. 7 Typical Collector-Emitter Saturation Voltage vs. Collector Current

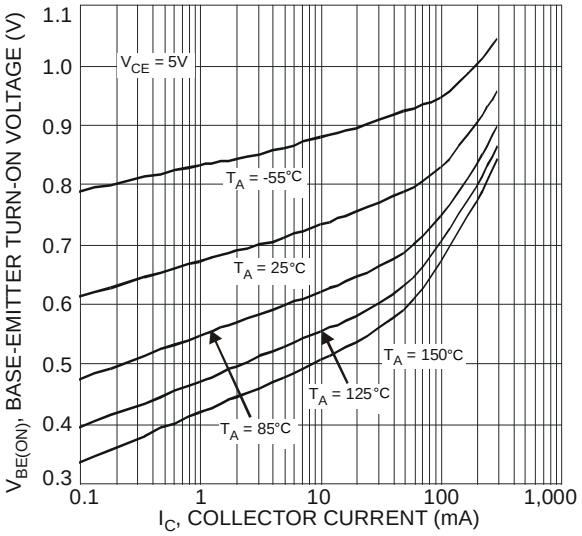


Fig. 8 Typical Base-Emitter Turn-On Voltage vs. Collector Current

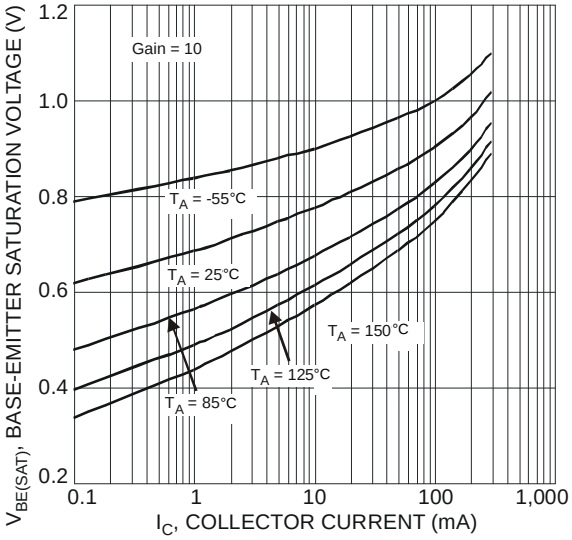


Fig. 9 Typical Base-Emitter Saturation Voltage vs. Collector Current

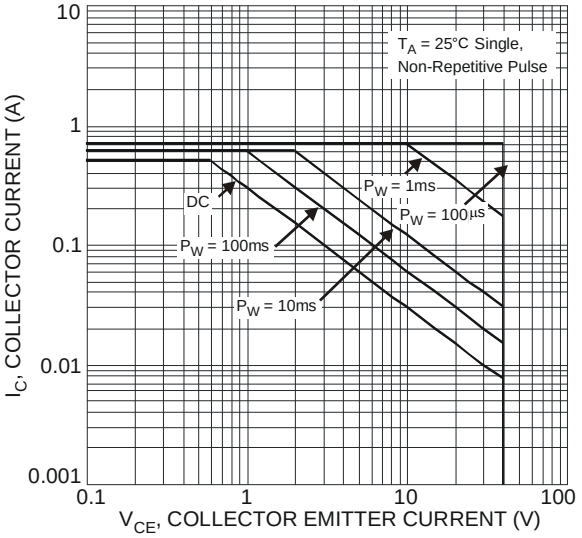


Fig. 10 Safe Operation Area (NPN)

Electrical Characteristics - PNP (Q2) (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS					
Collector-Base Breakdown Voltage	BV_{CBO}	-40	—	V	I_C = -10µA, I_E = 0
Collector-Emitter Breakdown Voltage (Note 8)	BV_{CEO}	-40	—	V	I_C = -1.0mA, I_B = 0
Emitter-Base Breakdown Voltage	BV_{EBO}	-5.0	—	V	I_E = -10µA, I_C = 0
Collector Cutoff Current	I_{CEX}	—	-50	nA	V_{CE} = -30V, $V_{EB(OFF)}$ = -3.0V
	I_{CBO}	—	-50	nA	V_{CE} = -30V, I_E = 0
Base Cutoff Current	I_{BL}	—	-50	nA	V_{CE} = -30V, $V_{EB(OFF)}$ = -3.0V
ON CHARACTERISTICS (Note 8)					
DC Current Gain	h_{FE}	60 80 100 60 30	— — 300 — —	—	I_C = -100µA, V_{CE} = -1.0V I_C = -1.0mA, V_{CE} = -1.0V I_C = -10mA, V_{CE} = -1.0V I_C = -50mA, V_{CE} = -1.0V I_C = -100mA, V_{CE} = -1.0V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	-0.25 -0.40	V	I_C = -10mA, I_B = -1.0mA I_C = -50mA, I_B = -5.0mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	-0.65 —	-0.85 -0.95	V	I_C = -10mA, I_B = -1.0mA I_C = -50mA, I_B = -5.0mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{OBO}	—	4.5	pF	V_{CB} = -5.0V, f = 1.0MHz, I_E = 0
Input Capacitance	C_{IBO}	—	10	pF	V_{EB} = -0.5V, f = 1.0MHz, I_C = 0
Input Impedance	h_{IE}	2.0	12	kΩ	V_{CE} = -10V, I_C = -1.0mA, f = 1.0kHz
Voltage Feedback Ratio	h_{RE}	0.1	10	x 10^{-4}	
Small Signal Current Gain	h_{FE}	100	400	—	
Output Admittance	h_{OE}	3.0	60	µS	
Current Gain-Bandwidth Product	f_T	300	—	MHz	V_{CE} = -20V, I_C = -10mA, f = 100MHz
SWITCHING CHARACTERISTICS					
Delay Time	t_D	—	35	ns	V_{CC} = -3.0V, I_C = -10mA, $V_{BE(OFF)}$ = 0.5V, I_{B1} = -1.0mA
Rise Time	t_R	—	35	ns	
Storage Time	t_S	—	225	ns	V_{CC} = -3.0V, I_C = -10mA, I_{B1} = $-I_{B2}$ = -1.0mA
Fall Time	t_F	—	75	ns	

Note: 8. Short duration pulse test used to minimize self-heating effect.

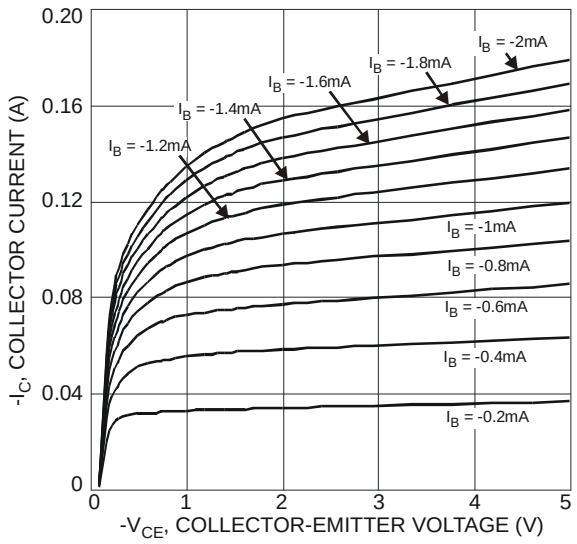


Fig. 11 Typical Collector Current vs. Collector-Emitter Voltage

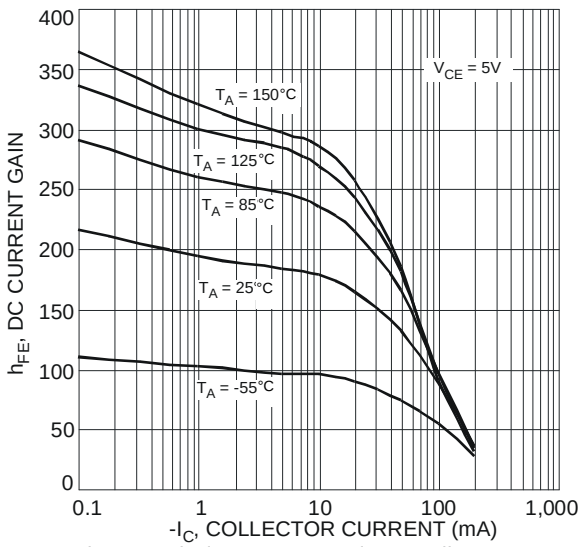


Fig. 12 Typical DC Current Gain vs. Collector Current

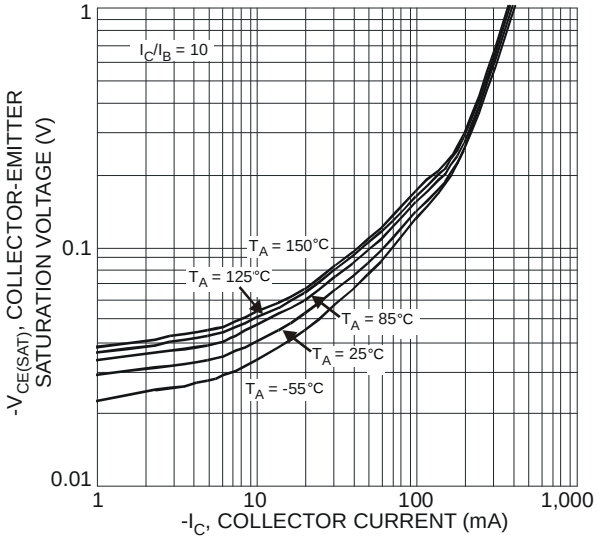


Fig. 13 Typical Collector-Emitter Saturation Voltage vs. Collector Current

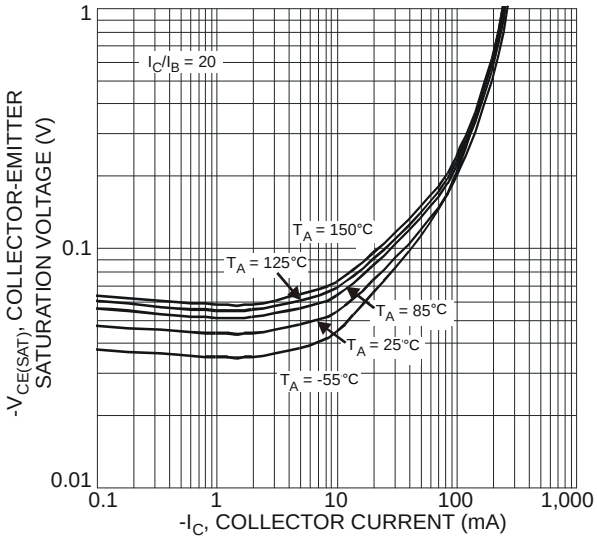


Fig. 14 Typical Collector-Emitter Saturation Voltage vs. Collector Current

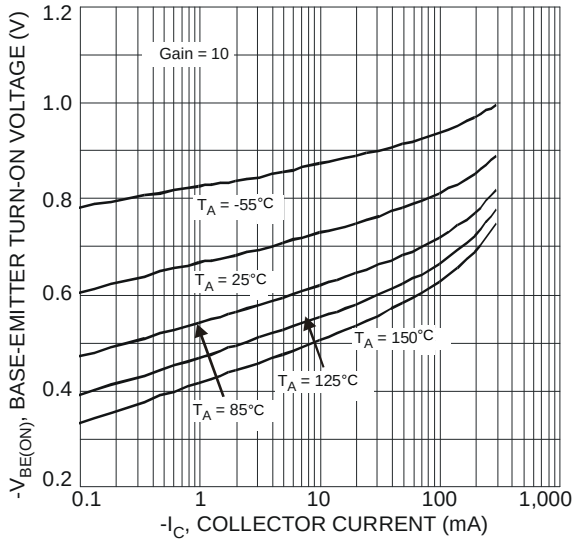


Fig. 15 Typical Base-Emitter Saturation Voltage vs. Collector Current

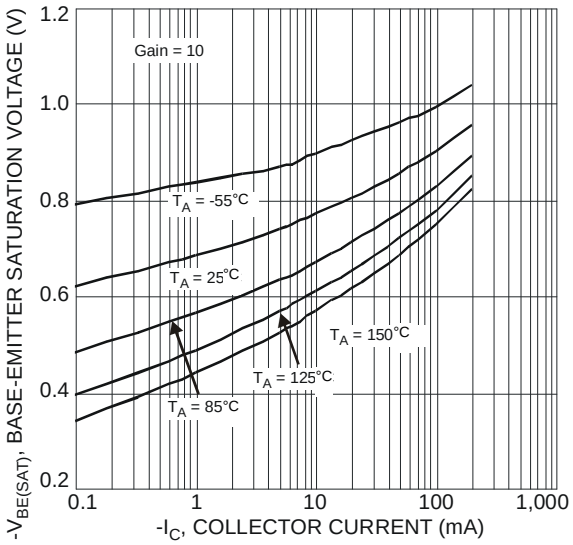


Fig. 16 Typical Base-Emitter Saturation Voltage vs. Collector Current

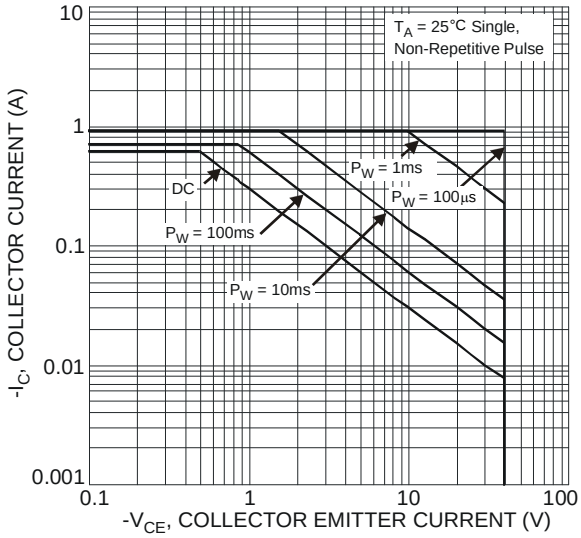
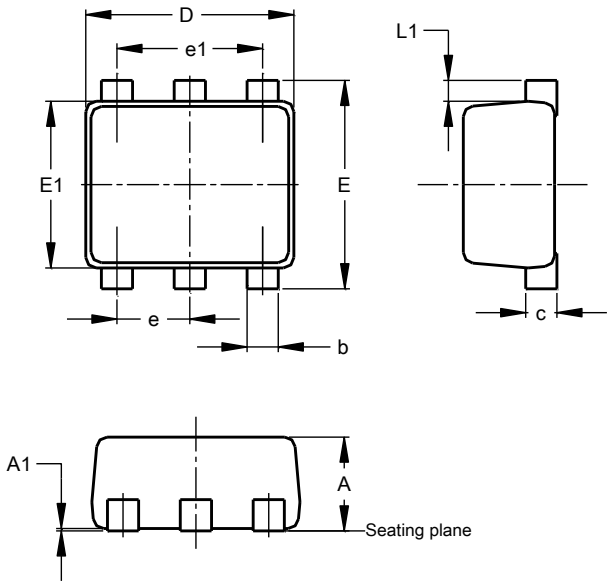


Fig. 17 Safe Operation Area (PNP)

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT963



SOT963			
Dim	**Min**	**Max**	**Typ**
A	0.40	0.50	0.45
A1	0.00	0.05	--
b	0.10	0.20	0.15
c	0.120	0.180	0.150
D	0.95	1.05	1.00
E	0.95	1.05	1.00
E1	0.75	0.85	0.80
e	--	--	0.35
e1	--	--	0.70
L1	0.05	0.15	0.10
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

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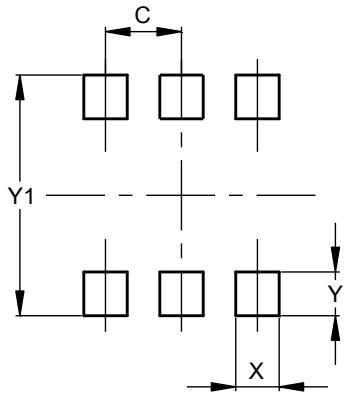

Dimensions	Value (in mm)
C	0.350
X	0.200
Y	0.200
Y1	1.100

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