DUAL 40V PNP SURFACE MOUNT TRANSISTOR

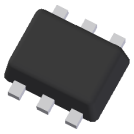
Features

- V_{CEO} = -40V
- I_C = -200mA
- Epitaxial Planar Die Construction
- Ideally Suited for Automated Assembly Processes
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Ultra Small Package**

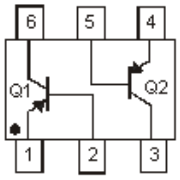
Mechanical Data

- Case: SOT963
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.0027 grams (Approximate)

SOT963



Top View



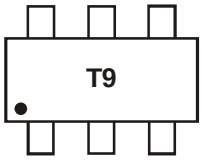
Device Schematic

Ordering Information (Note 4)

Part Number	Packaging	Shipping
DST3906DJ-7	SOT963	10,000/Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



T9 = Product Type Marking Code

Absolute Maximum Ratings (@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 - Continuous (Note 5)	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

ESD Ratings (Note 6)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3B
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes: 5. Device mounted on FR-4 PCB with minimum recommended pad layout.
6. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

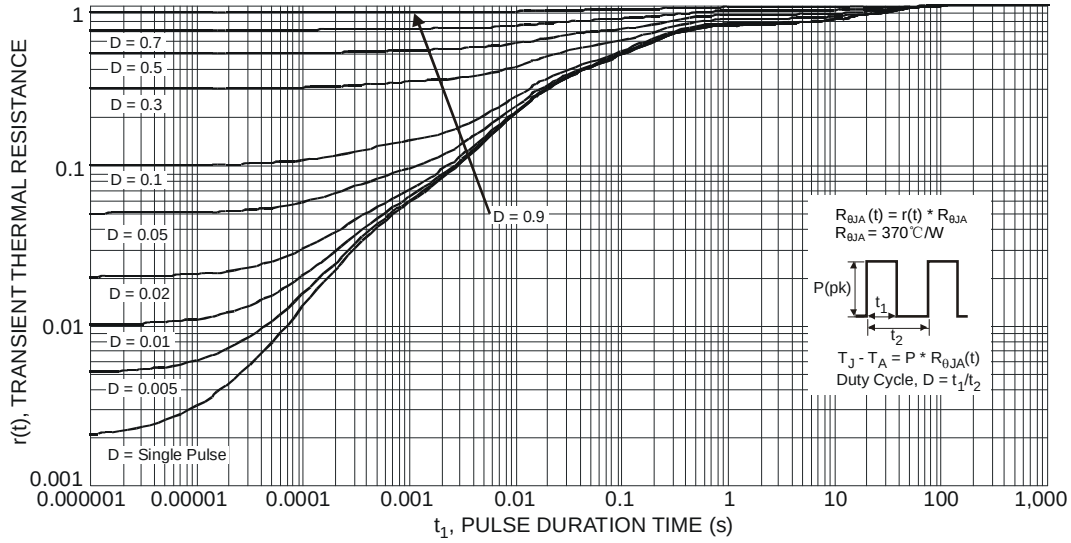


Fig. 1 Transient Thermal Response

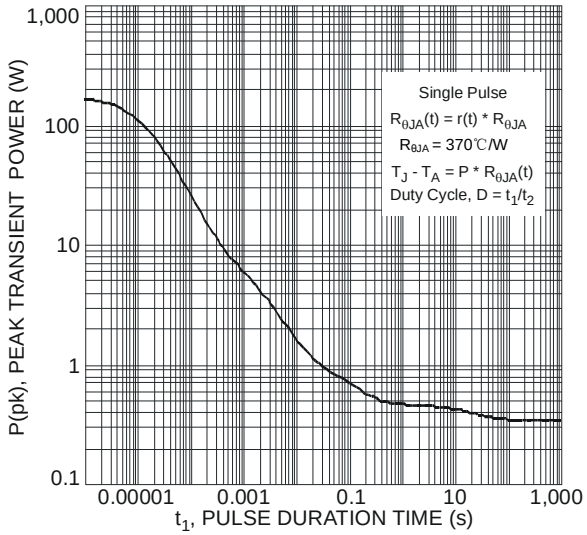


Fig. 2 Single Pulse Maximum Power Dissipation

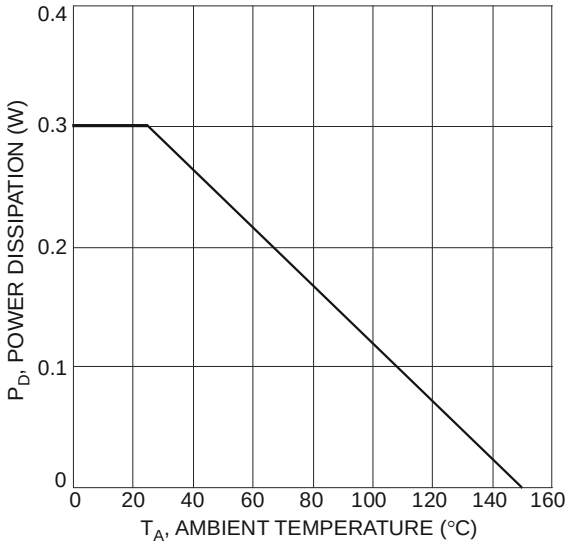


Fig. 3 Power Dissipation vs. Ambient Temperature

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

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-40	—	V	I_C = -10µA, I_E = 0
Collector-Emitter Breakdown Voltage (Note 7)	$V_{(BR)CEO}$	-40	—	V	I_C = -1mA, I_B = 0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-6	—	V	I_E = -10µA, I_C = 0
Collector Cutoff Current	I_{CEX}	—	-50	nA	V_{CE} = -30V, $V_{EB(OFF)}$ = -3V
	I_{CBO}	—	-50	nA	V_{CB} = -30V, I_E = 0
Base Cutoff Current	I_{BL}	—	-50	nA	V_{CE} = -30V, $V_{EB(OFF)}$ = -3V
ON CHARACTERISTICS (Note 7)					
DC Current Gain	h_{FE}	60 80 100 60 30	— — 300 — —	—	I_C = -100µA, V_{CE} = -1V I_C = -1.0mA, V_{CE} = -1V I_C = -10mA, V_{CE} = -1V I_C = -50mA, V_{CE} = -1V I_C = -100mA, V_{CE} = -1V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	-0.25 -0.40	V	I_C = -10mA, I_B = -1mA I_C = -50mA, I_B = -5mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	-0.65 —	-0.85 -0.95	V	I_C = -10mA, I_B = -1mA I_C = -50mA, I_B = -5mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{OBO}	—	4.5	pF	V_{CB} = -5V, f = 1MHz, I_E = 0
Input Capacitance	C_{IBO}	—	10	pF	V_{EB} = -0.5V, f = 1MHz, I_C = 0
Input Impedance	h_{ie}	2	12	kΩ	V_{CE} = -10V, I_C = -1mA, f = 1kHz
Voltage Feedback Ratio	h_{re}	0.1	10	x 10^{-4}	
Small Signal Current Gain	h_{fe}	100	400	—	
Output Admittance	h_{oe}	3	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} = -3V, I_C = -10mA, I_{B1} = -1mA
Rise Time	t_R	—	35	ns	
Storage Time	t_S	—	225	ns	V_{CC} = -3V, I_C = -10mA, I_{B2} = 1mA
Fall Time	t_F	—	75	ns	

Note: 7. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

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

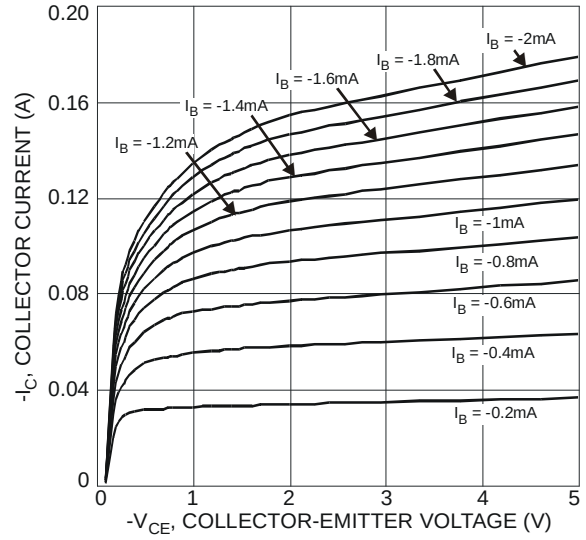


Fig. 4 Typical Collector Current vs. Collector-Emitter Voltage

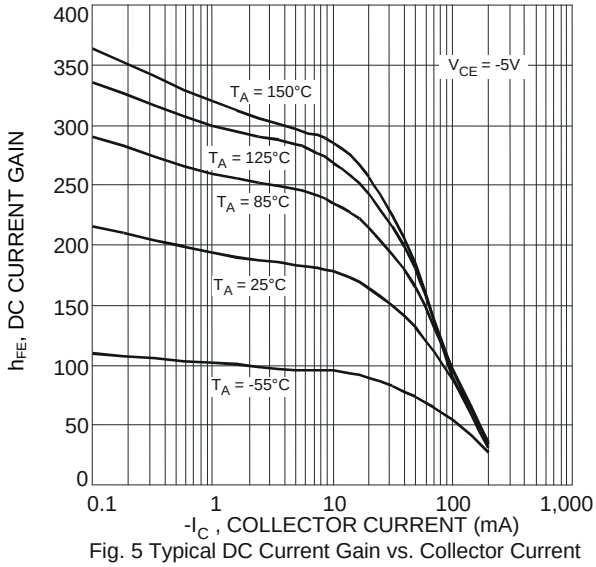


Fig. 5 Typical DC Current Gain vs. Collector Current

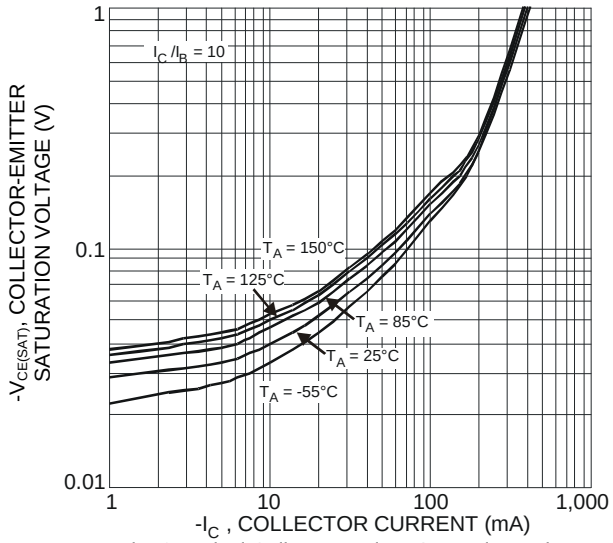


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

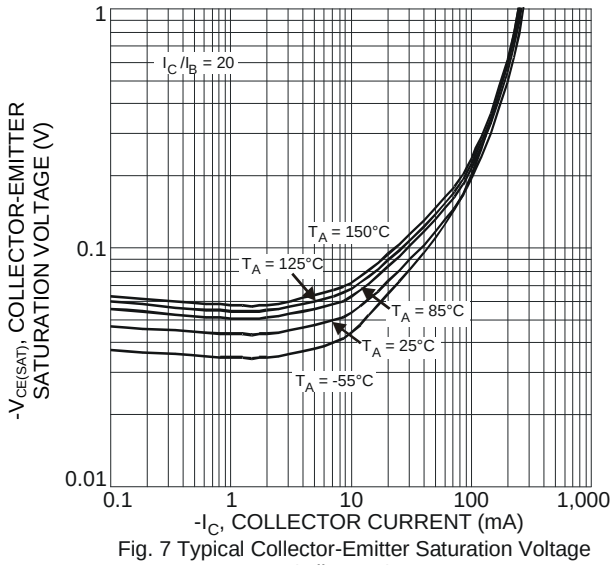


Fig. 7 Typical Collector-Emitter Saturation Voltage vs. Collector Current

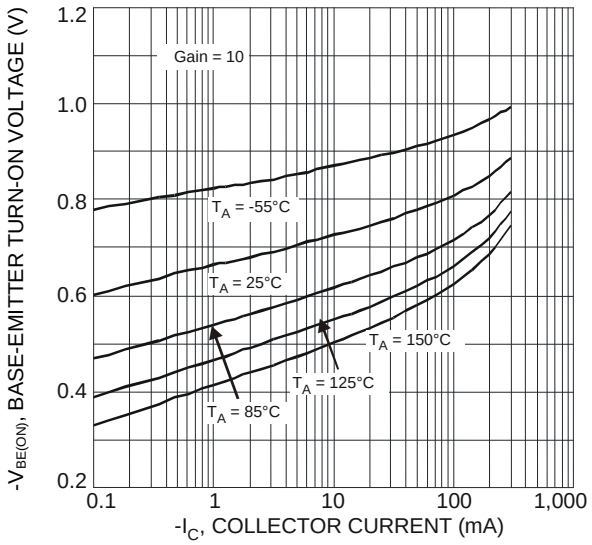


Fig. 8 Typical Base-Emitter Saturation Voltage vs. Collector Current

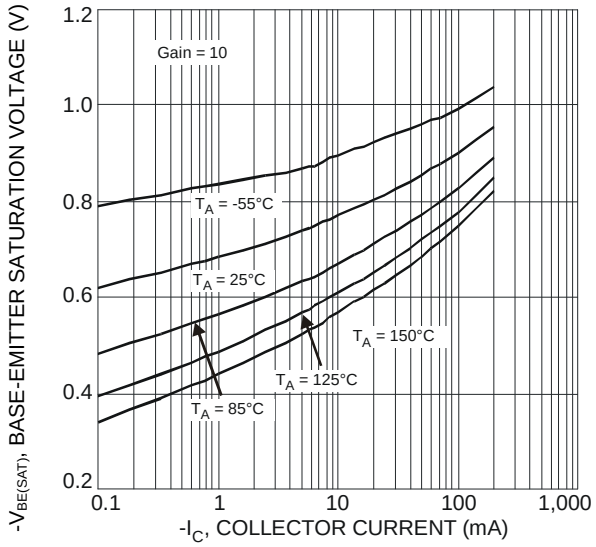


Fig. 9 Typical Base-Emitter Saturation Voltage vs. Collector Current

Typical Electrical Characteristics (Cont. @T_A = +25°C, unless otherwise specified.)

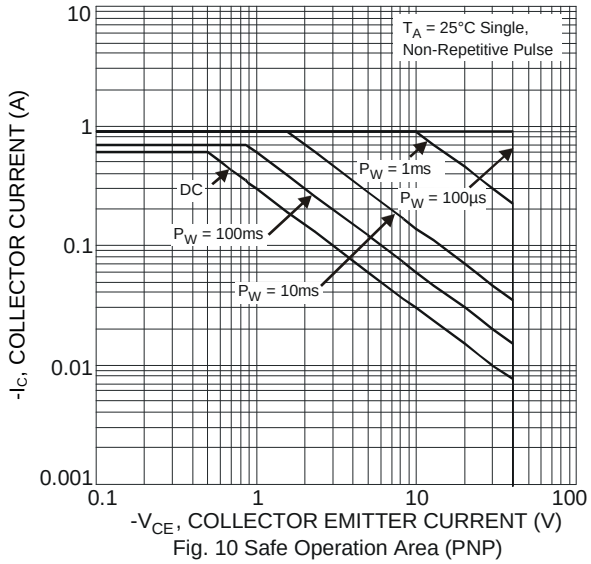


Fig. 10 Safe Operation Area (PNP)

Package Outline Dimensions

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

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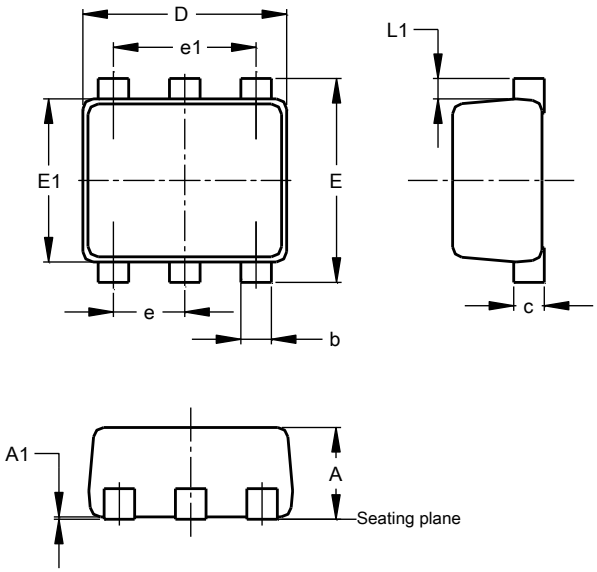

SOT963			
Dim	**Min**	**Max**	**Typ**
A	0.40	0.50	0.45
A1	0.00	0.05	--
b	0.10	0.20	0.15
c	0.120	0.180	0.150
D	0.95	1.05	1.00
E	0.95	1.05	1.00
E1	0.75	0.85	0.80
e	--	--	0.35
e1	--	--	0.70
L1	0.05	0.15	0.10
All Dimensions in mm			

Suggest Pad Layout

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

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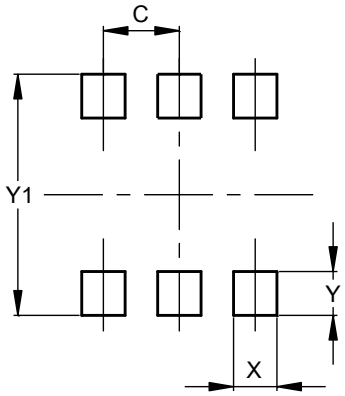

Dimensions	Value (in mm)
C	0.350
X	0.200
Y	0.200
Y1	1.100

Note: The suggested land pattern dimensions have been provided for reference only, as actual pad layouts may vary depending on application. These dimensions may be modified based on user equipment capability or fabrication criteria. A more robust pattern may be desired for wave soldering and is calculated by adding 0.2mm to the 'Z' dimension. For further information, please reference document IPC-7351A, Naming Convention for Standard SMT Land Patterns, and for International grid details, please see document IEC, Publication 97.

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