

## Features

- $V_{CE0} = 40V$
- $I_C = 200mA$
- Epitaxial Planar Die Construction
- Ideally Suited for Automated Assembly Processes
- **Lead, Halogen and Antimony Free, RoHS Compliant (Note 1)**
- **“Green” Device (Note 2)**
- **Ultra Small Package**

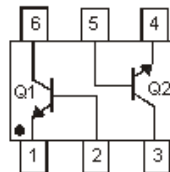
## Mechanical Data

- Case: SOT-963
- 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
- Weight: 0.0027 grams (approximate)

SOT-963



Top View



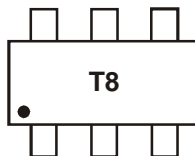
Device Schematic

## Ordering Information

Device	Packaging	Shipping
DST3904DJ-7	SOT-963	10,000/Tape & Reel

- Notes:
1. No purposefully added lead. Halogen and Antimony Free.
  2. Diodes Inc's “Green” Policy can be found on our website at <http://www.diodes.com>

## Marking Information



T8 = Product Type Marking Code

**Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	40	V
Emitter-Base Voltage	V <sub>EBO</sub>	6.0	V
Collector Current - Continuous (Note 3)	I <sub>C</sub>	200	mA

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3)	P <sub>D</sub>	300	mW
Thermal Resistance, Junction to Ambient (Note 3)	R <sub>θJA</sub>	417	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Notes: 3. Device mounted on FR-4 PCB with minimum recommended pad layout.

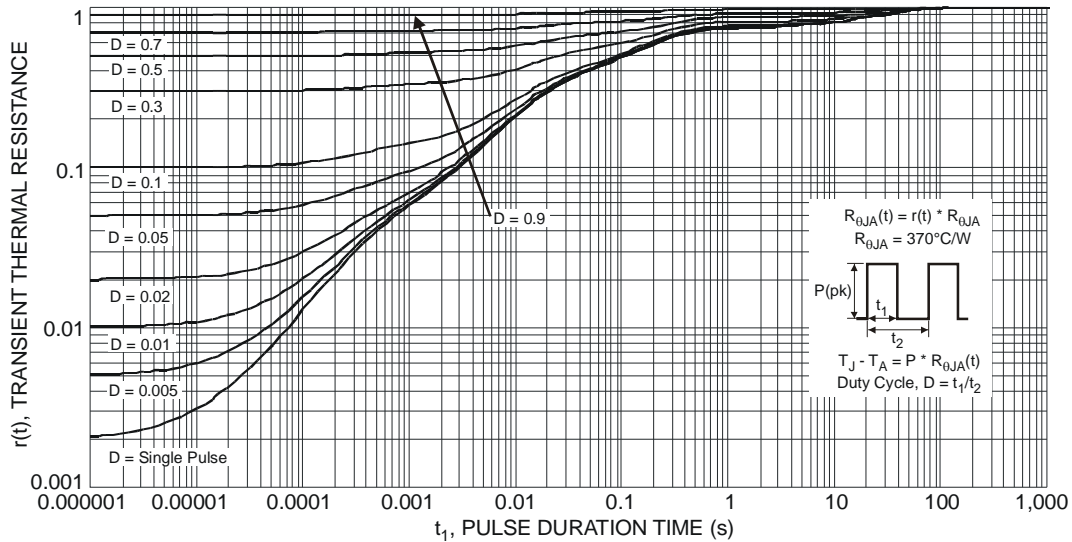


Fig. 1 Transient Thermal Response

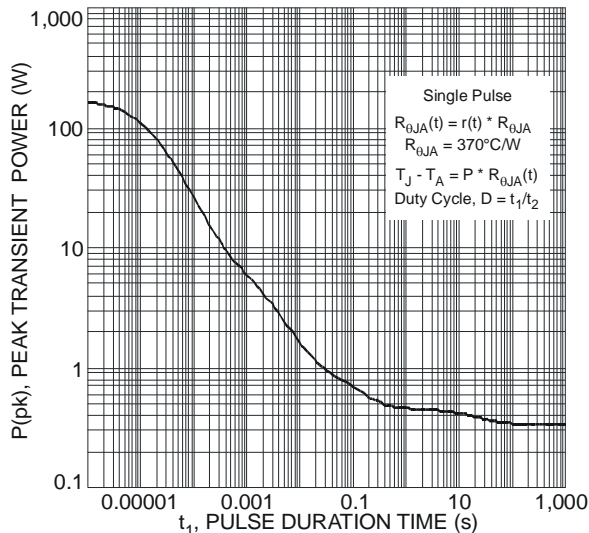


Fig. 2 Single Pulse Maximum Power Dissipation

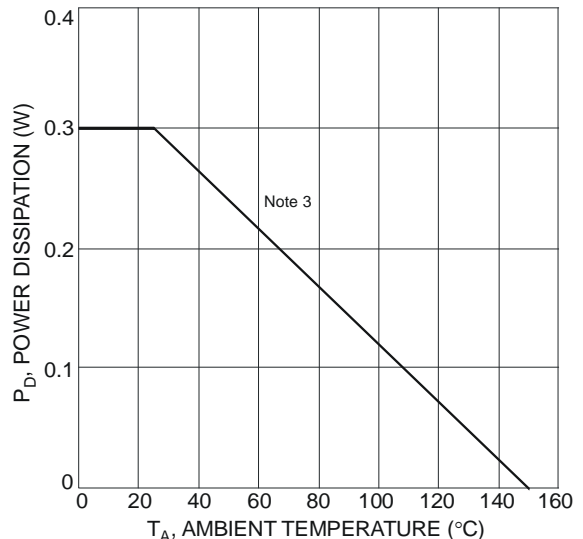


Fig. 3 Power Dissipation vs. Ambient Temperature

**Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	60	—	V	$I_C = 10\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 4)	$V_{(BR)CEO}$	40	—	V	$I_C = 1.0\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6.0	—	V	$I_E = 10\mu\text{A}, I_C = 0$
Collector Cutoff Current	$I_{CEX}$	—	50	nA	$V_{CE} = 30\text{V}, V_{EB(OFF)} = 3.0\text{V}$
Base Cutoff Current	$I_{BL}$	—	50	nA	$V_{CE} = 30\text{V}, V_{EB(OFF)} = 3.0\text{V}$
<b>ON CHARACTERISTICS (Note 4)</b>					
DC Current Gain	$h_{FE}$	40	—	—	$I_C = 100\mu\text{A}, V_{CE} = 1.0\text{V}$
		70	—		$I_C = 1.0\text{mA}, V_{CE} = 1.0\text{V}$
		100	300		$I_C = 10\text{mA}, V_{CE} = 1.0\text{V}$
		60	—		$I_C = 50\text{mA}, V_{CE} = 1.0\text{V}$
		30	—		$I_C = 100\text{mA}, V_{CE} = 1.0\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	0.20 0.30	V	$I_C = 10\text{mA}, I_B = 1.0\text{mA}$ $I_C = 50\text{mA}, I_B = 5.0\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	0.65 —	0.85 0.95	V	$I_C = 10\text{mA}, I_B = 1.0\text{mA}$ $I_C = 50\text{mA}, I_B = 5.0\text{mA}$
<b>SMALL SIGNAL CHARACTERISTICS</b>					
Output Capacitance	$C_{obo}$	—	4.0	pF	$V_{CB} = 5.0\text{V}, f = 1.0\text{MHz}, I_E = 0$
Input Capacitance	$C_{ibo}$	—	8.5	pF	$V_{EB} = 0.5\text{V}, f = 1.0\text{MHz}, I_C = 0$
Input Impedance	$h_{ie}$	1.0	10	k $\Omega$	$V_{CE} = 10\text{V}, I_C = 1.0\text{mA}, f = 1.0\text{kHz}$
Voltage Feedback Ratio	$h_{re}$	0.5	8.0	$\times 10^{-4}$	
Small Signal Current Gain	$h_{fe}$	100	400	—	
Output Admittance	$h_{oe}$	1.0	40	$\mu\text{S}$	
Current Gain-Bandwidth Product	$f_T$	300	—	MHz	$V_{CE} = 20\text{V}, I_C = 10\text{mA}, f = 100\text{MHz}$
<b>SWITCHING CHARACTERISTICS</b>					
Delay Time	$t_d$	—	35	ns	$V_{CC} = 3.0\text{V}, I_C = 10\text{mA}$
Rise Time	$t_r$	—	35	ns	$V_{BE(off)} = -0.5\text{V}, I_{B1} = 1.0\text{mA}$
Storage Time	$t_s$	—	200	ns	$V_{CC} = 3.0\text{V}, I_C = 10\text{mA}$
Fall Time	$t_f$	—	50	ns	$I_{B1} = I_{B2} = 1.0\text{mA}$

Notes: 4. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

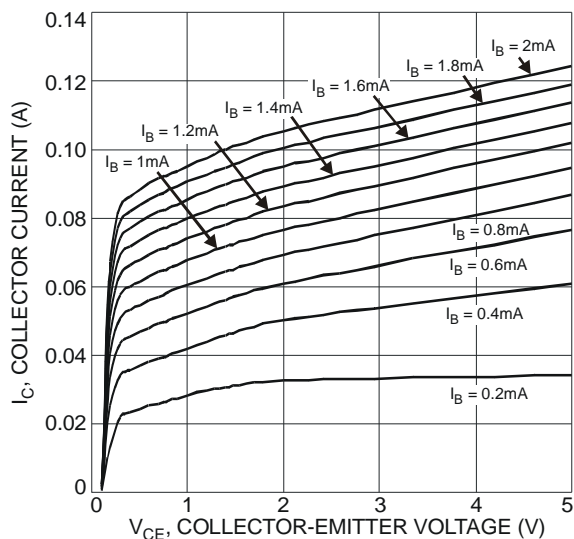


Fig. 4 Typical Collector Current vs. Collector-Emitter Voltage

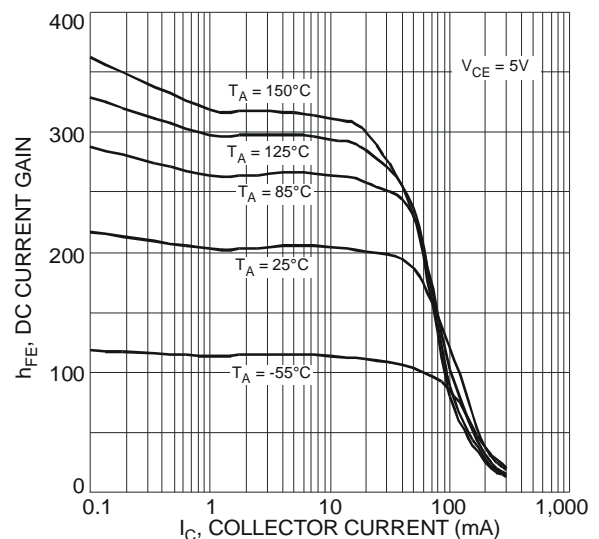


Fig. 5 Typical DC Current Gain vs. Collector Current

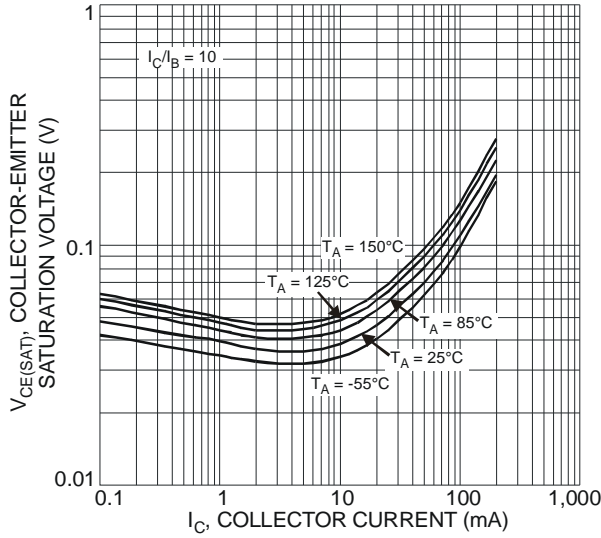


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

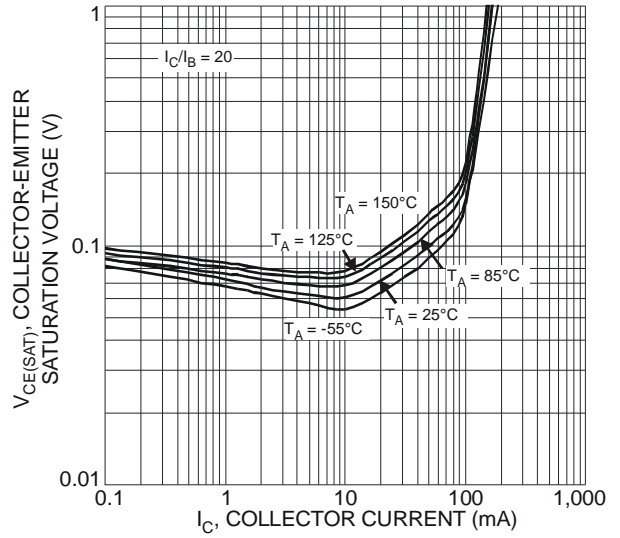


Fig. 7 Typical Collector-Emitter Saturation Voltage vs. Collector Current

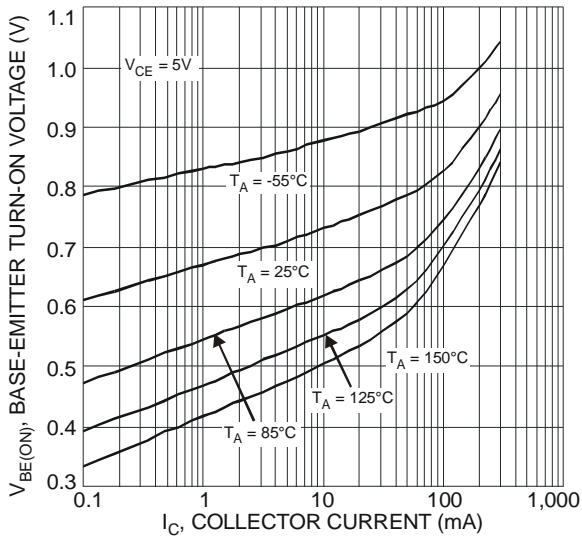


Fig. 8 Typical Base-Emitter Turn-On Voltage vs. Collector Current

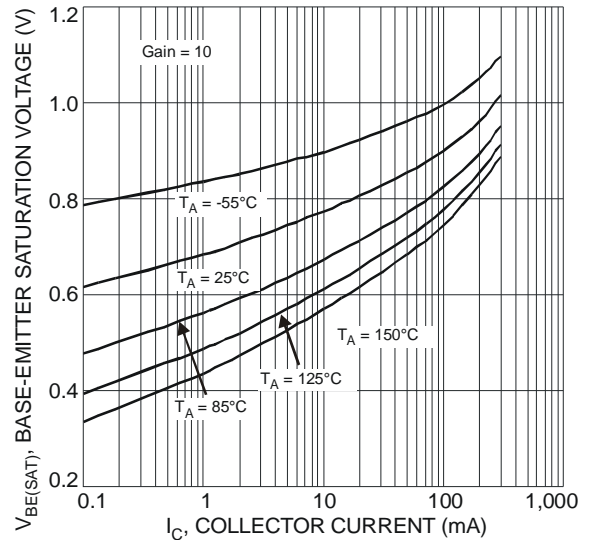


Fig. 9 Typical Base-Emitter Saturation Voltage vs. Collector Current

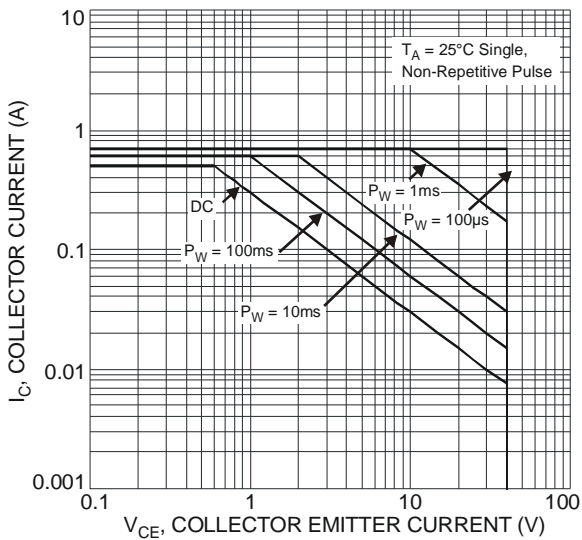
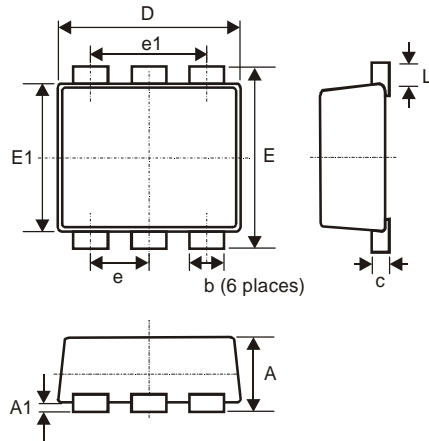


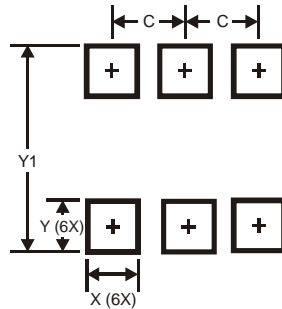
Fig. 10 Safe Operation Area (NPN)

**Package Outline Dimensions**



SOT-963			
Dim	Min	Max	Typ
A	0.40	0.50	0.45
A1	0	0.05	-
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
L	0.05	0.15	0.10
b	0.10	0.20	0.15
e	0.35 Typ		
e1	0.70 Typ		
All Dimensions in mm			

**Suggest Pad Layout**



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

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