40V NPN LOW SATURATION TRANSISTOR IN X1-DFN1006-3

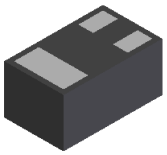
Features

- BV_{CEO} > 40V
- I_C = 500mA High Collector Current
- I_{CM} = 1A Peak Pulse Current
- P_D = 1000mW Power Dissipation
- Low Collector-Emitter Saturation Voltage, $V_{CE(sat)}$
- 0.60mm² Package Footprint, 13 Times Smaller than SOT23
- 0.5mm Height Package Minimizing Off-Board Profile
- Complementary NPN Type DSS3540M
- **Totally Lead Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at https://www.diodes.com/products/automotive/automotive-products/.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**

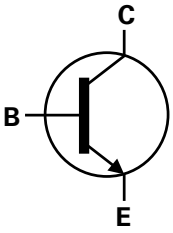
Mechanical Data

- Package: X1-DFN1006-3
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu. Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.0009 grams (Approximate)

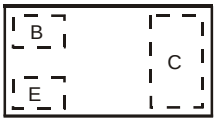
X1-DFN1006-3



Bottom View



Device Symbol



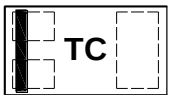
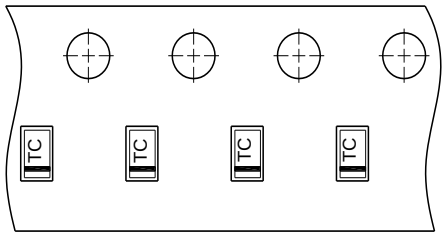
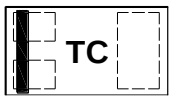
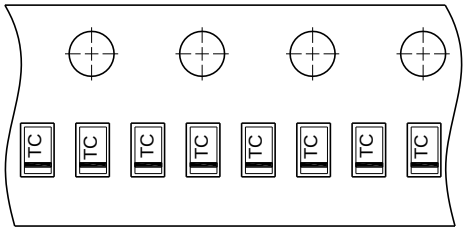
Top View
Device Schematic

Ordering Information (Note 4)

Orderable Part Number	Package	Marking Code	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
DSS2540M-7	X1-DFN1006-3	TC	7	8mm	3,000	Reel
DSS2540M-7B	X1-DFN1006-3	TC	7	8mm	10,000	Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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

DSS2540M-7	 TC = Product Type Marking Code Top View Bar Denotes Base and Emitter Side 
DSS2540M-7B	 TC = Product Type Marking Code Top View Bar Denotes Base and Emitter Side 

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}	6	V
Collector Current - Continuous	I_C	500	mA
Peak Pulse Collector Current	I_{CM}	1	A
Peak Base Current	I_{BM}	100	mA

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	400	mW
	(Note 6)		1000	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	310	°C/W
	(Note 6)		120	
Thermal Resistance, Junction to Lead	(Note 7)	$R_{\theta JL}$	120	°C/W
Operating and Storage and Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 8)

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

Notes:
5. For the device mounted on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady state condition. The entire exposed collector pad is attached to the heatsink.
6. Same as Note 5, except the exposed collector pad is mounted on 25mm x 25mm 2oz copper.
7. Thermal resistance from junction to solder-point (on the exposed collector pad).
8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics

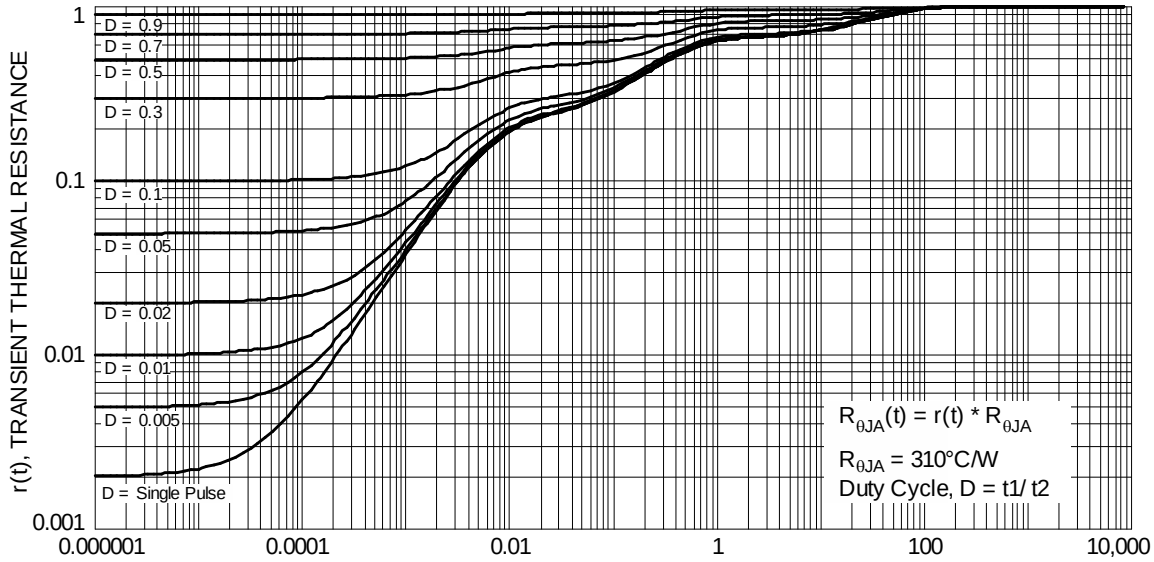


Fig. 1 Transient Thermal Resistance

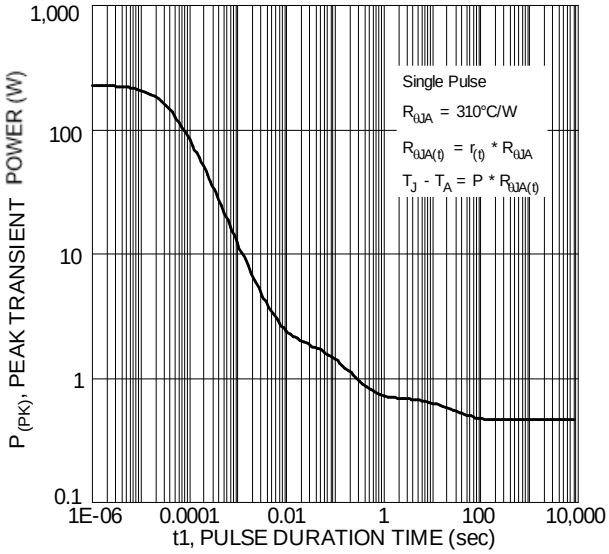


Fig. 2 Single Pulse Maximum Power Dissipation

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	40	—	—	V	I_C = 100µA, I_E = 0
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	40	—	—	V	I_C = 10mA, I_B = 0
Emitter-Base Breakdown Voltage	BV_{EBO}	6	—	—	V	I_E = 100µA, I_C = 0
Collector Cutoff Current	I_{CBO}	—	—	100 50	nA µA	V_{CB} = 30V, I_E = 0 V_{CB} = 30V, I_E = 0, T_A = +150°C
Emitter Cutoff Current	I_{EBO}	—	—	100	nA	V_{EB} = 5V, I_C = 0
ON CHARACTERISTICS (Note 9)						
DC Current Gain	h_{FE}	200 150 50	— — —	— — —	—	V_{CE} = 2V, I_C = 10mA V_{CE} = 2V, I_C = 100mA V_{CE} = 2V, I_C = 500mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	— — — —	— — — —	50 100 200 250	mV	I_C = 10mA, I_B = 0.5mA I_C = 100mA, I_B = 5mA I_C = 200mA, I_B = 10mA I_C = 500mA, I_B = 50mA
Collector-Emitter Saturation Resistance	$R_{CE(sat)}$	—	—	500	mΩ	I_C = 500mA, I_B = 50mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	1.2	V	I_C = 500mA, I_B = 50mA
Base-Emitter Turn On Voltage	$V_{BE(on)}$	—	—	1.1	V	V_{CE} = 2V, I_C = 100mA
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C_{obo}	—	—	6	pF	V_{CB} = 10V, f = 1.0MHz
Current Gain-Bandwidth Product	f_T	250	300	—	MHz	V_{CE} = 5V, I_C = 100mA, f = 100MHz

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

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

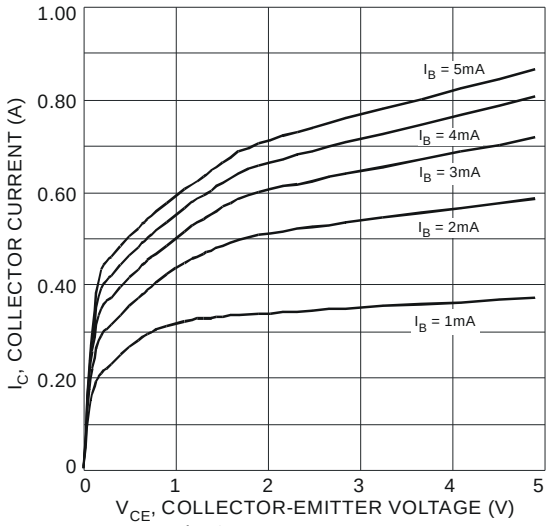


Fig. 3 Typical Collector Current vs. Collector-Emitter Voltage

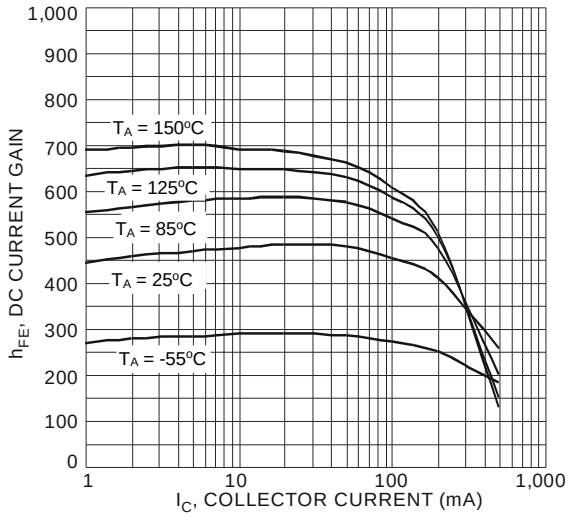


Fig. 4 Typical DC Current Gain vs. Collector Current

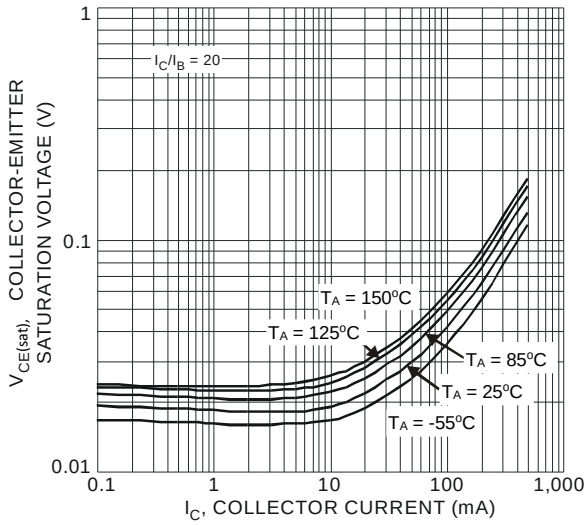


Fig. 5 Typical Collector-Emitter Saturation Voltage vs. Collector Current

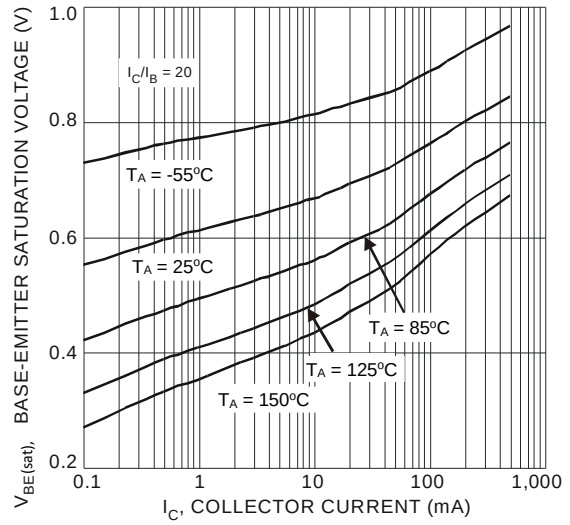


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

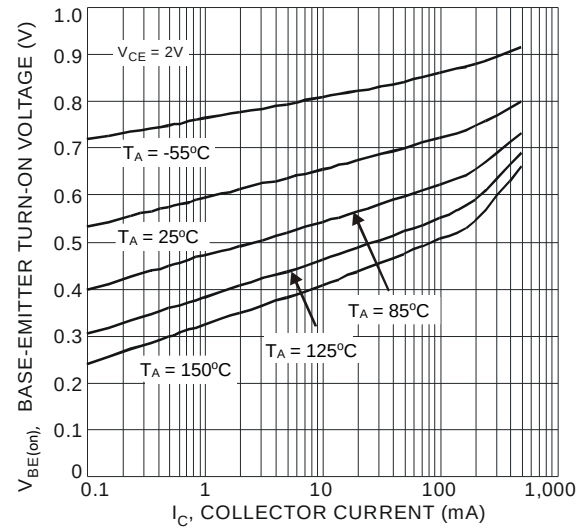


Fig. 7 Typical Base-Emitter Turn-On Voltage vs. Collector Current

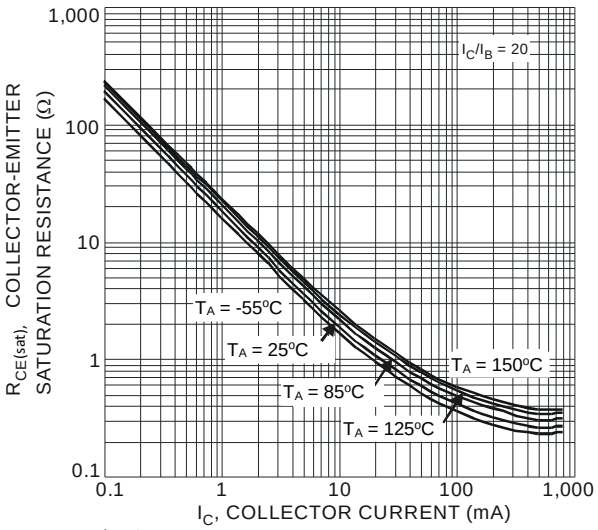
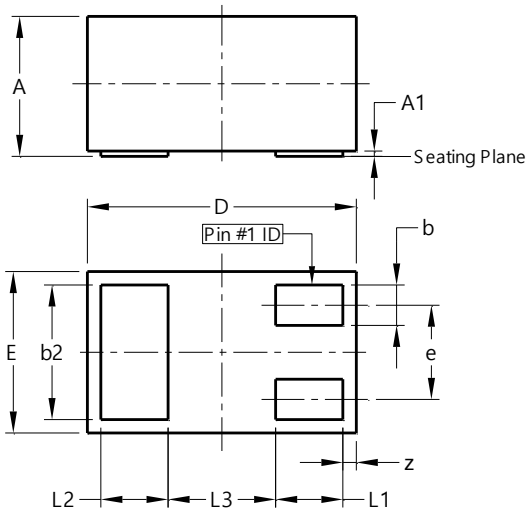


Fig. 8 Typical Collector-Emitter Saturation Resistance vs. Collector Current

Package Outline Dimensions

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

X1-DFN1006-3

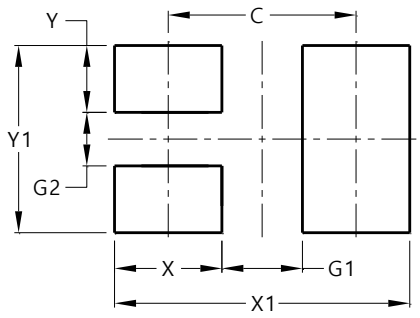


X1-DFN1006-3			
Dim	**Min**	**Max**	**Typ**
A	0.47	0.53	0.50
A1	0.00	0.05	0.03
b	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.075	1.00
E	0.55	0.675	0.60
e	-	-	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
L3	-	-	0.40
z	0.02	0.08	0.05
All Dimensions in mm			

Suggested Pad Layout

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

X1-DFN1006-3



Dimensions	Value (in mm)
C	0.70
G1	0.30
G2	0.20
X	0.40
X1	1.10
Y	0.25
Y1	0.70

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