

Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirement of Automotive Applications.

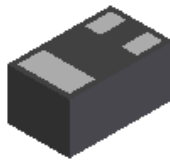
Features

- $BV_{CEO} > -15V$
- $I_C = -500mA$ High Collector Current
- $I_{CM} = -1A$ Peak Pulse Current
- $P_D = 1000mW$ Power Dissipation
- Low Collector-Emitter Saturation Voltage, $V_{CE(SAT)}$
- $0.60mm^2$ Package Footprint, 13 Times Smaller than SOT23
- 0.5mm Height Package Minimizing Off-Board Profile
- Complementary NPN Type DSS2515M
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

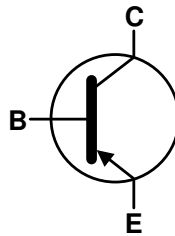
Mechanical Data

- Case: X1-DFN1006-3
- Case 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
- Weight: 0.0009 grams (Approximate)

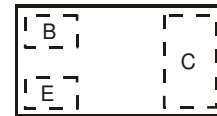
X1-DFN1006-3



Bottom View



Device Symbol



Top View
Device Schematic

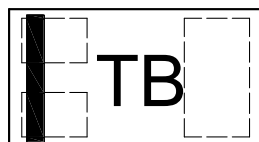
Ordering Information (Note 5)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DSS3515MQ-7	Automotive	TB	7	8	10,000

- 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

X1-DFN1006-3



TB = Product Type Marking Code
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}	-15	V
Collector-Emitter Voltage	V _{CEO}	-15	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	P _D	(Note 6) 400	mW
		(Note 7) 1000	
Thermal Resistance, Junction to Ambient	R _{θJA}	(Note 6) 310	°C/W
		(Note 7) 120	
Thermal Resistance, Junction to Lead	R _{θJL}	120	°C/W
Operating and Storage and Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 9)

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

- Notes:
6. For the device mounted on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in steady state condition. The entire exposed collector pad is attached to the heatsink.
 7. Same as Note 6, except the exposed collector pad is mounted on 25mm x 25mm 2oz copper.
 8. Thermal resistance from junction to solder-point (on the exposed collector pad).
 9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics

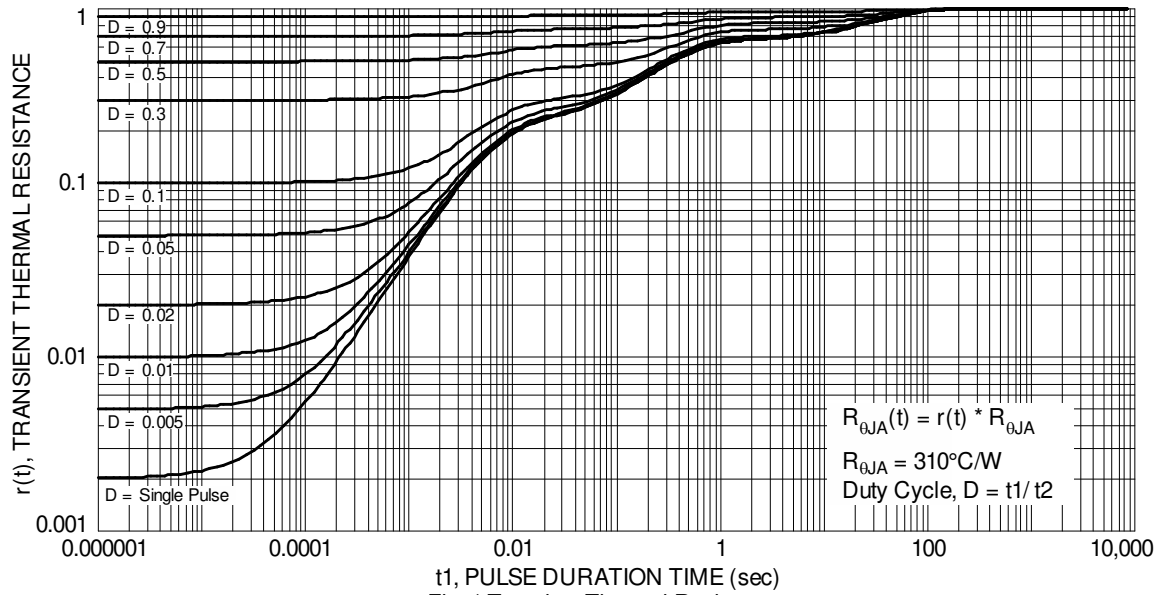


Fig. 1 Transient Thermal Resistance

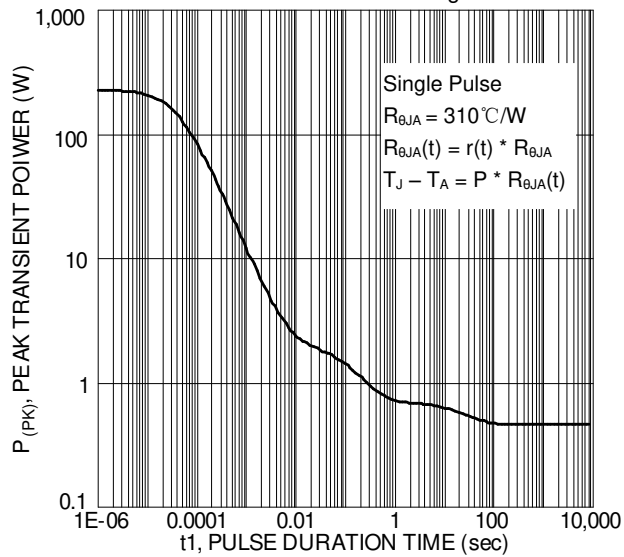


Fig. 2 Single Pulse Maximum Power Dissipation

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}	-15	—	—	V	I _C = -100μA, I _E = 0
Collector-Emitter Breakdown Voltage (Note 10)	BV _{CEO}	-15	—	—	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	nA	V _{CB} = -15V, I _E = 0
				-50	μA	V _{CB} = -15V, I _E = 0, T _A = +150°C
Emitter Cutoff Current	I _{EBO}	—	—	-100	nA	V _{EB} = -5V, I _C = 0
ON CHARACTERISTICS (Note 10)						
DC Current Gain	h _{FE}	200	—	—	—	V _{CE} = -2V, I _C = -10mA
		150	—	—		V _{CE} = -2V, I _C = -100mA
		90	—	—		V _{CE} = -2V, I _C = -500mA
Collector-Emitter Saturation Voltage	V _{CE(SAT)}	—	—	-25	mV	I _C = -10mA, I _B = -0.5mA
		—	—	-150		I _C = -200mA, I _B = -10mA
		—	—	-250		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)}	—	—	-1.1	V	I _C = -500mA, I _B = -50mA
Base-Emitter Turn On Voltage	V _{BE(ON)}	—	—	-0.9	V	V _{CE} = -2V, I _C = -100mA
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C _{obo}	—	—	10	pF	V _{CB} = -10V, f = 1.0MHz
Current Gain-Bandwidth Product	f _T	100	340	—	MHz	V _{CE} = -5V, I _C = -100mA, f = 100MHz

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

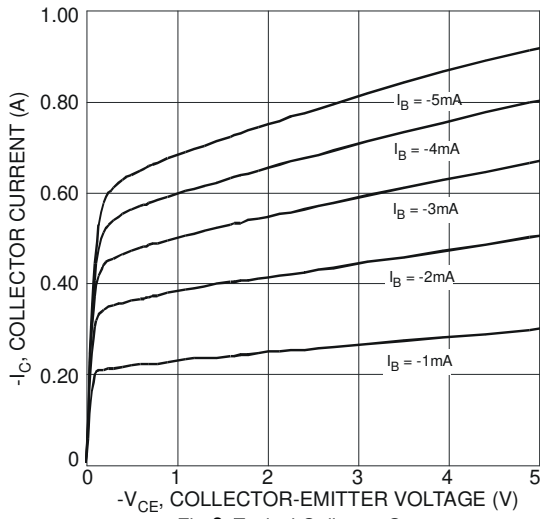


Fig. 3 Typical Collector Current vs. Collector-Emitter Voltage

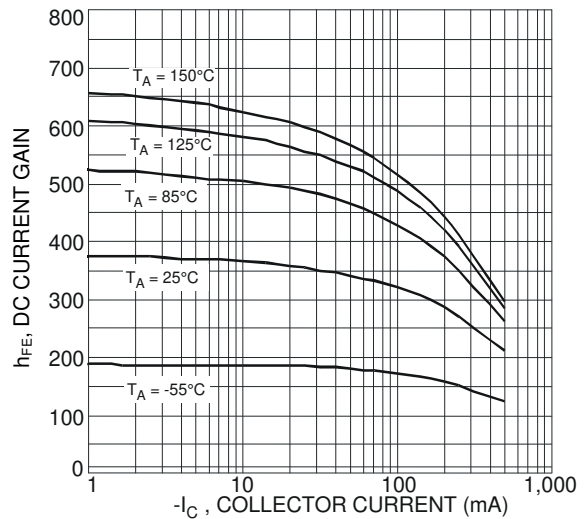


Fig. 4 Typical DC Current Gain vs. Collector Current

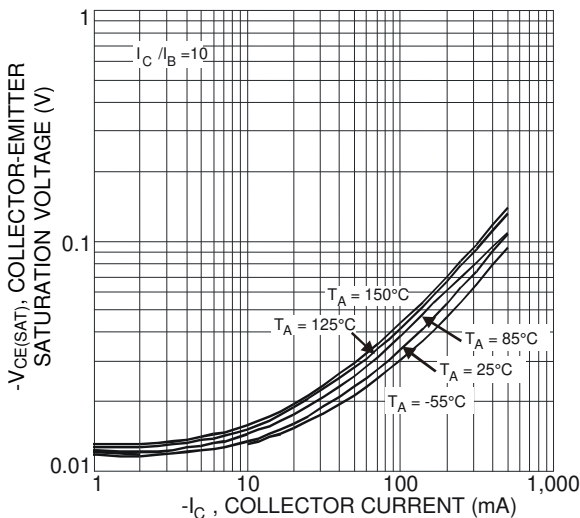


Fig. 5 Typical Collector-Emitter Saturation Voltage vs. Collector Current

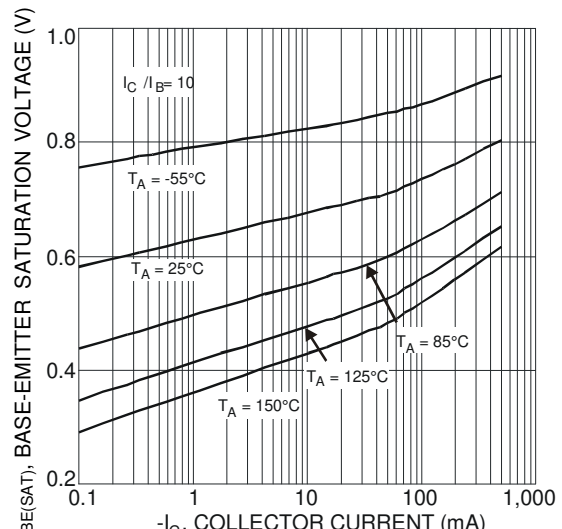


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

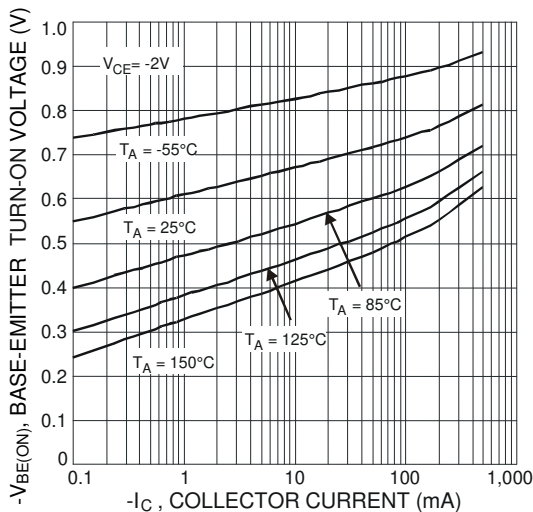


Fig. 7 Typical Base-Emitter Turn-On Voltage vs. Collector Current

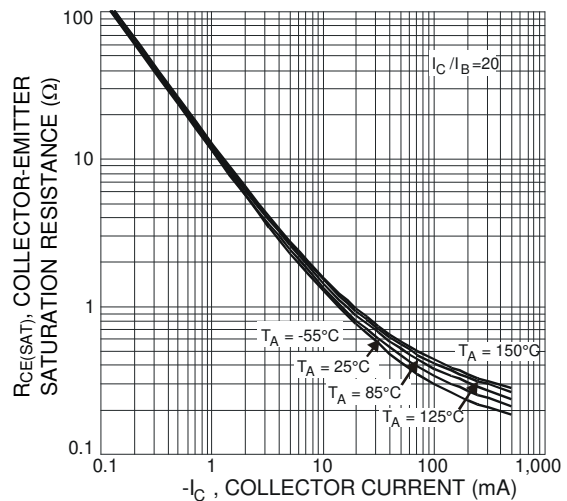
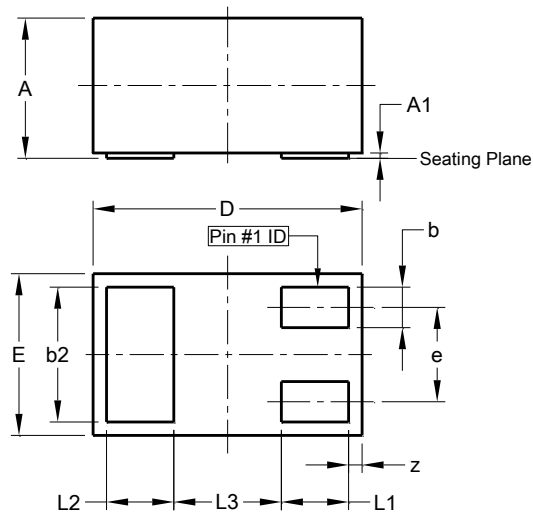


Fig. 8 Typical Collector-Emitter Saturation Resistance vs. Collector Current

Package Outline Dimensions

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

X1-DFN1006-3

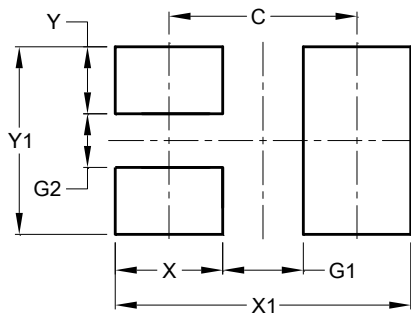


X1-DFN1006-3			
Dim	Min	Max	Typ
A	0.47	0.53	0.50
A1	0.00	0.05	0.03
b	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.075	1.00
E	0.55	0.675	0.60
e	—	—	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
L3	—	—	0.40
z	0.02	0.08	0.05
All Dimensions in mm			

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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