

LOW $V_{CE(SAT)}$ NPN SURFACE MOUNT TRANSISTOR

Features

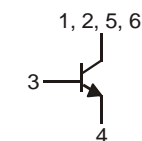
- Epitaxial Planar Die Construction
- Complementary PNP Type Available (DSS5140V)
- Low Collector-Emitter Saturation Voltage, $V_{CE(SAT)}$
- Surface Mount Package Suited for Automated Assembly
- Ultra-Small Surface Mount Package
- **Lead Free/RoHS Compliant (Note 1)**
- **"Green Device" (Note 2)**

Mechanical Data

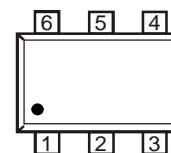
- Case: SOT-563
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.003 grams (approximate)

Top View

Bottom View



Device Schematic



Pin Out Configuration

Maximum Ratings @ $T_A = 25^\circ\text{C}$ 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	V
Collector Current - Continuous	I_C	1	A
Repetitive Peak Collector Current (Note 3)	I_{CRP}	2	A
Peak Pulse Collector Current	I_{CM}	3	A
Base Current (DC)	I_B	300	mA
Peak Base Current	I_{BM}	1	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 4) @ $T_A = 25^\circ\text{C}$	P_D	600	mW
Thermal Resistance, Junction to Ambient (Note 4) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	208	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
1. No purposefully added lead.
 2. Diode's Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
 3. Operated under pulsed conditions: Pulse width $\leq 30\text{ms}$; duty cycle ≤ 0.2 .
 4. Device mounted on FR-4 PCB with minimum recommended pad layout.

Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	V _{(BR)CBO}	40	—	—	V	I _C = 100μA, I _E = 0
Collector-Emitter Breakdown Voltage (Note 5)	V _{(BR)CEO}	40	—	—	V	I _C = 10mA, I _B = 0
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	5	—	—	V	I _E = 100μA, I _C = 0
Collector Cutoff Current	I _{CBO}	—	—	100 50	nA μA	V _{CB} = 40V, I _E = 0 V _{CB} = 40V, I _E = 0, T _A = 150°C
Collector Cutoff Current	I _{CES}	—	—	100	nA	V _{CE} = 40V, V _{BE} = 0
Emitter Cutoff Current	I _{EBO}	—	—	100	nA	V _{EB} = 5V, I _C = 0
ON CHARACTERISTICS (Note 5)						
DC Current Gain	h _{FE}	300 300 200 75	— — — —	— 900 — —	—	V _{CE} = 5V, I _C = 1mA V _{CE} = 5V, I _C = 500mA V _{CE} = 5V, I _C = 1A V _{CE} = 5V, I _C = 2A
Collector-Emitter Saturation Voltage	V _{CE(SAT)}	— — — —	— — — —	80 110 190 440	mV	I _C = 100mA, I _B = 1mA I _C = 500mA, I _B = 50mA I _C = 1A, I _B = 100mA I _C = 2A, I _B = 200mA
Collector-Emitter Saturation Resistance	R _{CE(SAT)}	—	—	190	mΩ	I _C = 1A, I _B = 100mA
Base-Emitter Saturation Voltage	V _{BE(SAT)}	—	—	1.2	V	I _C = 1A, I _B = 100mA
Base-Emitter Turn On Voltage	V _{BE(ON)}	—	—	1.1	V	V _{CE} = 5V, I _C = 1A
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C _{obo}	—	—	10	pF	V _{CB} = 10V, f = 1.0MHz
Current Gain-Bandwidth Product	f _T	150	—	—	MHz	V _{CE} = 10V, I _C = 50mA, f = 100MHz
SWITCHING CHARACTERISTICS						
Turn-On Time	t _{on}	—	58	—	ns	V _{CC} = 10V I _C = 0.5A, I _{B1} = I _{B2} = 25mA
Delay Time	t _d	—	30	—	ns	
Rise Time	t _r	—	28	—	ns	
Turn-Off Time	t _{off}	—	375	—	ns	
Storage Time	t _s	—	350	—	ns	
Fall Time	t _f	—	25	—	ns	

Notes: 5. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤2%.

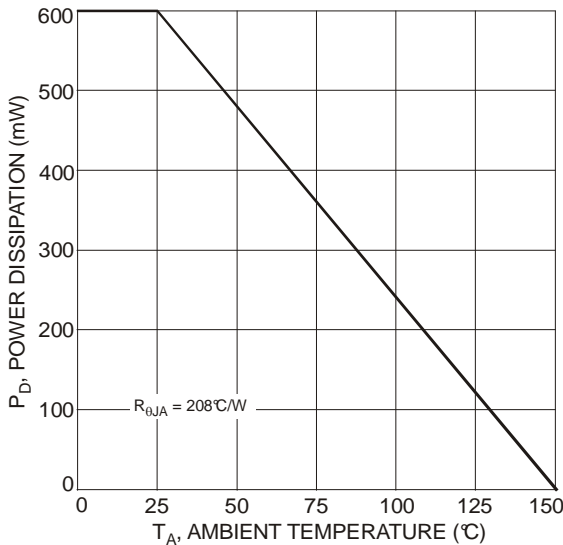


Fig. 1 Power Dissipation vs. Ambient Temperature (Note 4)

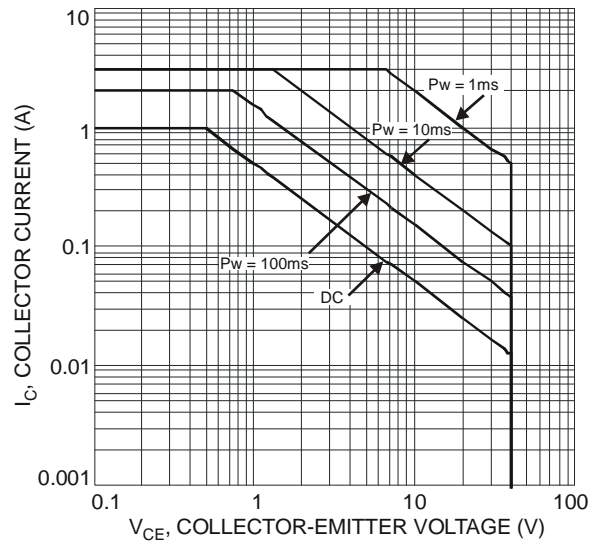


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage (Note 4)

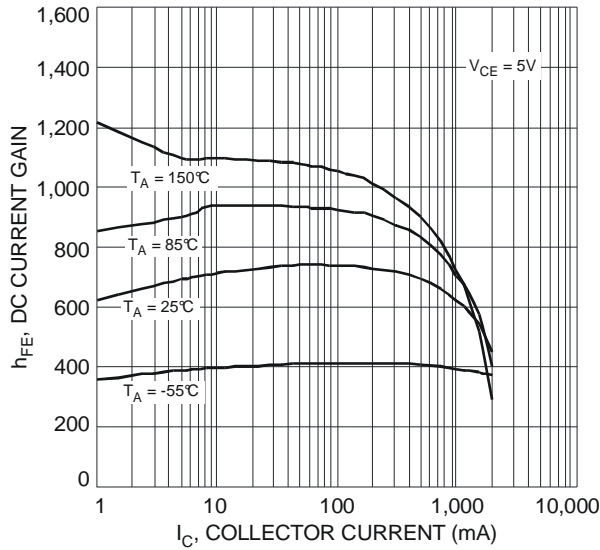


Fig. 3 Typical DC Current Gain vs. Collector Current

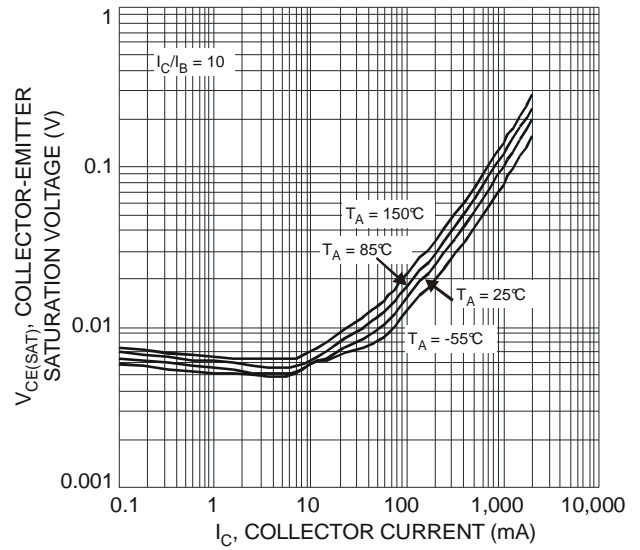


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

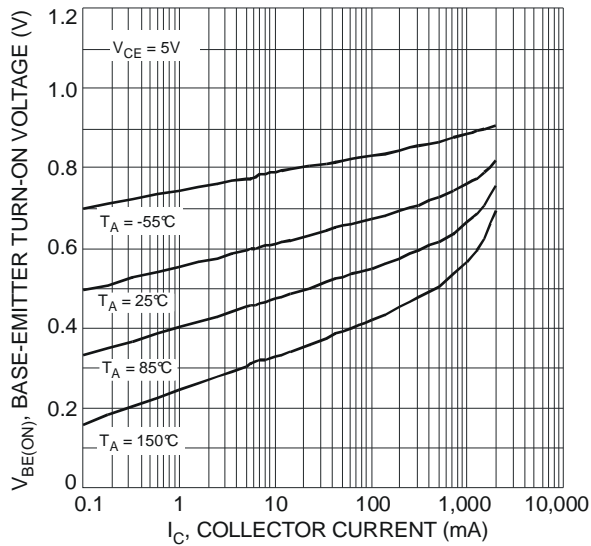


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

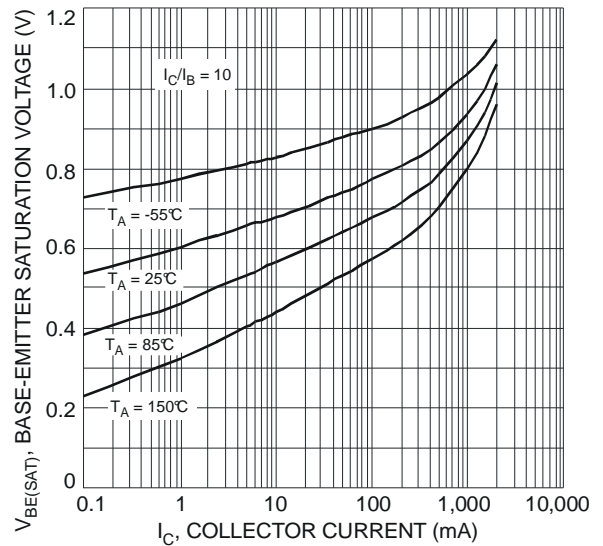


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

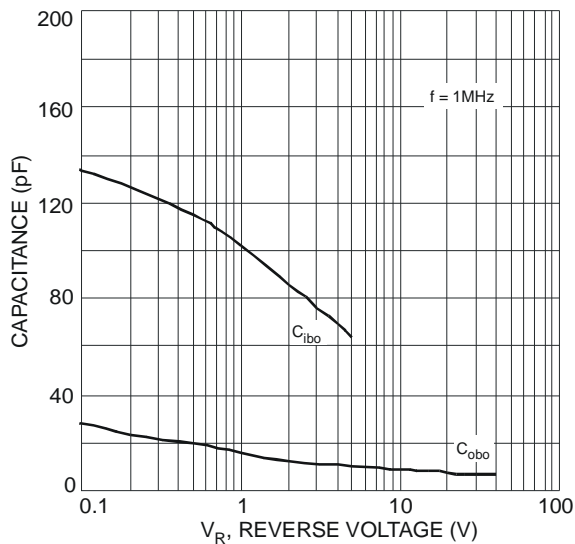


Fig. 7 Typical Capacitance Characteristics

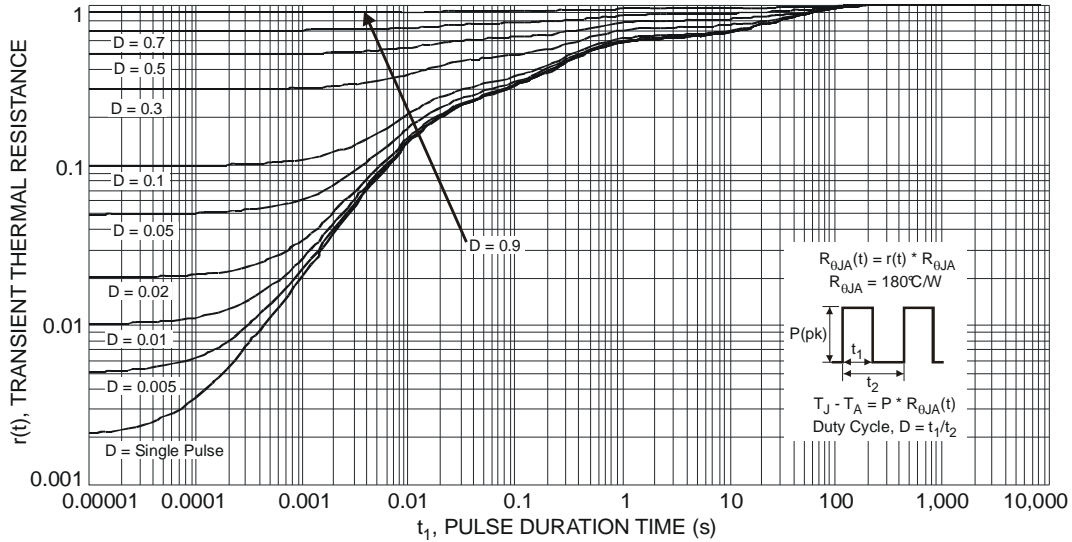


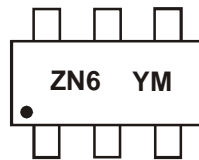
Fig. 8 Transient Thermal Response (Note 4)

Ordering Information (Note 6)

Part Number	Case	Packaging
DSS4140V-7	SOT-563	3000/Tape & Reel

Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information



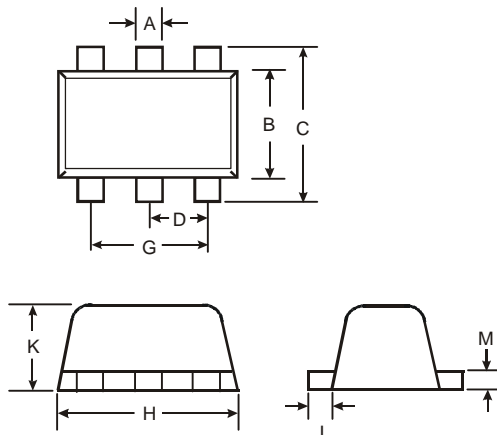
ZN6 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: V = 2008)
 M = Month (ex: 9 = September)

Date Code Key

Year	2008	2009	2010	2011	2012	2013	2014	2015
Code	V	W	X	Y	Z	A	B	C

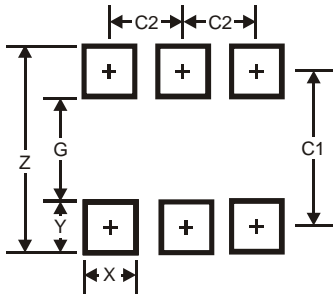
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Package Outline Dimensions



SOT-563			
Dim	Min	Max	Typ
A	0.15	0.30	0.20
B	1.10	1.25	1.20
C	1.55	1.70	1.60
D	-	-	0.50
G	0.90	1.10	1.00
H	1.50	1.70	1.60
K	0.55	0.60	0.60
L	0.10	0.30	0.20
M	0.10	0.18	0.11
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.2
G	1.2
X	0.375
Y	0.5
C1	1.7
C2	0.5

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