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

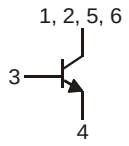
NEW PRODUCT

Features

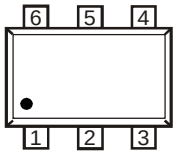
- Epitaxial Planar Die Construction
- Complementary PNP Type Available (DSS5220V)
- Low Collector-Emitter Saturation Voltage, $V_{CE(SAT)}$
- High Current Gain (h_{FE}) at High I_C
- Surface Mount Package Suited for Automated Assembly
- Ultra-Small Surface Mount Package
- **Lead Free/RoHS Compliant (Note 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)



Device Schematic



Pin Out Configuration

Top View

Bottom View

Maximum Ratings @T_A = 25℃ unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	20	V
Collector-Emitter Voltage	V_{CEO}	20	V
Emitter-Base Voltage	V_{EBO}	5	V
Collector Current - Continuous	I_C	2	A
Peak Pulse Collector Current	I_{CM}	4	A
Base Current (DC)	I_B	0.3	A
Peak Base Current	I_{BM}	0.6	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3) @ T_A = 25°C	P_D	600	mW
Thermal Resistance, Junction to Ambient (Note 3) @ T_A = 25°C	$R_{\theta JA}$	208	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°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. Device mounted on FR-4 PCB with minimum recommended pad layout.

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Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	20	—	—	V	I_C = 100μA, I_E = 0
Collector-Emitter Breakdown Voltage (Note 4)	$V_{(BR)CEO}$	20	—	—	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} = 20V, I_E = 0 V_{CB} = 20V, I_E = 0, T_A = 150°C
Collector Cutoff Current	I_{CES}	—	—	100	nA	V_{CE} = 20V, V_{BE} = 0
Emitter Cutoff Current	I_{EBO}	—	—	100	nA	V_{EB} = 5V, I_C = 0
ON CHARACTERISTICS (Note 4)						
DC Current Gain	h_{FE}	220 220 220 200 120	— — — — —	— — — — —	—	V_{CE} = 2V, I_C = 1mA V_{CE} = 2V, I_C = 100mA V_{CE} = 2V, I_C = 500mA V_{CE} = 2V, I_C = 1A V_{CE} = 2V, I_C = 2A
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	— — — —	— — — —	55 95 180 175 355 350	mV	I_C = 100mA, I_B = 1mA I_C = 500mA, I_B = 50mA I_C = 1A, I_B = 50mA I_C = 1A, I_B = 100mA I_C = 2A, I_B = 100mA I_C = 2A, I_B = 200mA
Collector-Emitter Saturation Resistance	$R_{CE(SAT)}$	—	—	175	mΩ	I_C = 1A, I_B = 100mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	1.1 1.2	V	I_C = 1A, I_B = 50mA 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}	—	16	—	pF	V_{CB} = 10V, f = 1.0MHz
Current Gain-Bandwidth Product	f_T	—	260	—	MHz	V_{CE} = 10V, I_C = 50mA, f = 100MHz
SWITCHING CHARACTERISTICS						
Turn-On Time	t_{on}	—	60	—	ns	V_{CC} = 10V I_C = 1A, I_{B1} = I_{B2} = 50mA
Delay Time	t_d	—	20	—	ns	
Rise Time	t_r	—	40	—	ns	
Turn-Off Time	t_{off}	—	225	—	ns	
Storage Time	t_s	—	205	—	ns	
Fall Time	t_f	—	20	—	ns	

Notes: 4. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤2%.

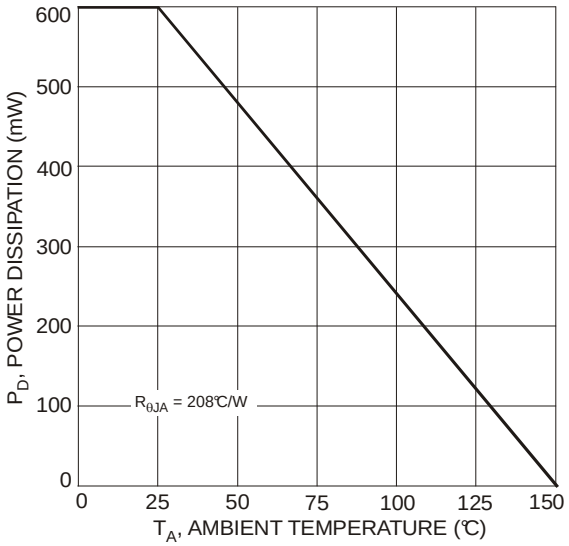

Fig. 1 Power Dissipation vs. Ambient Temperature (Note 3)

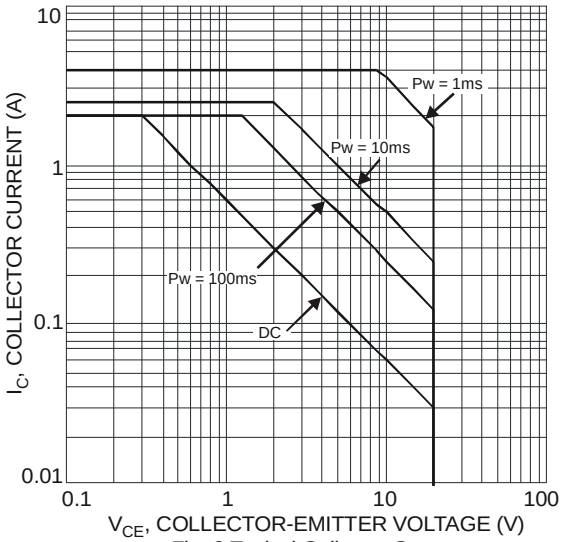

Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage (Note 3)

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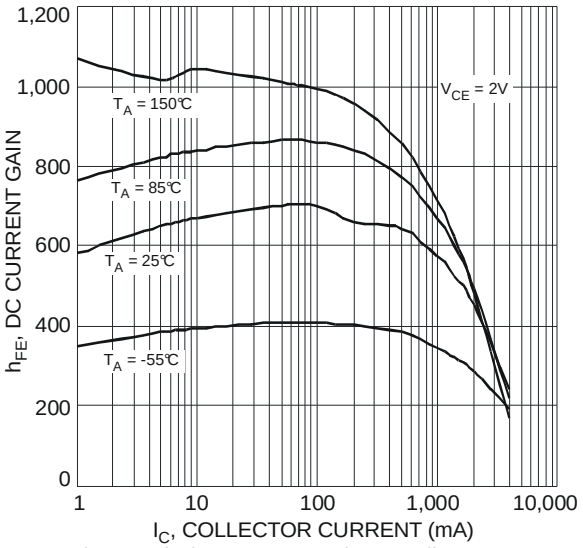

Fig. 3 Typical DC Current Gain vs. Collector Current

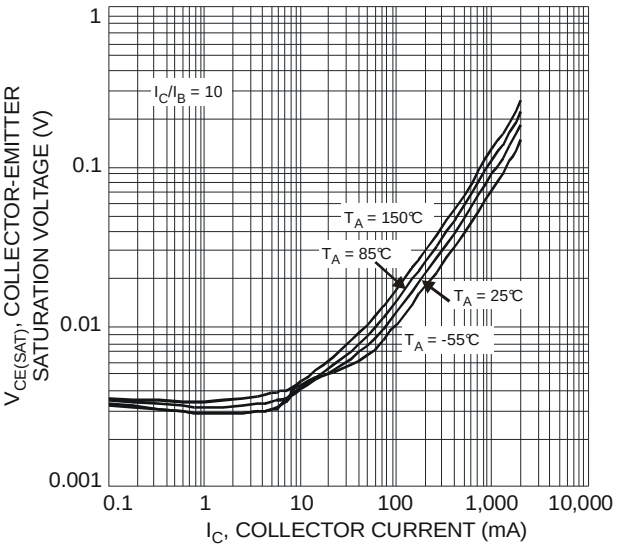

Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

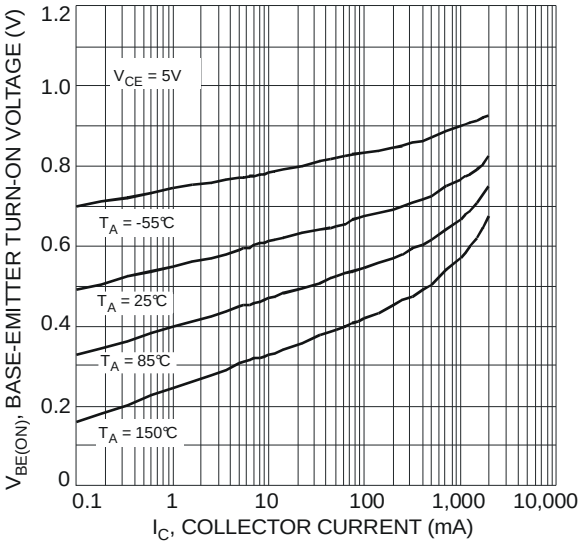

Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

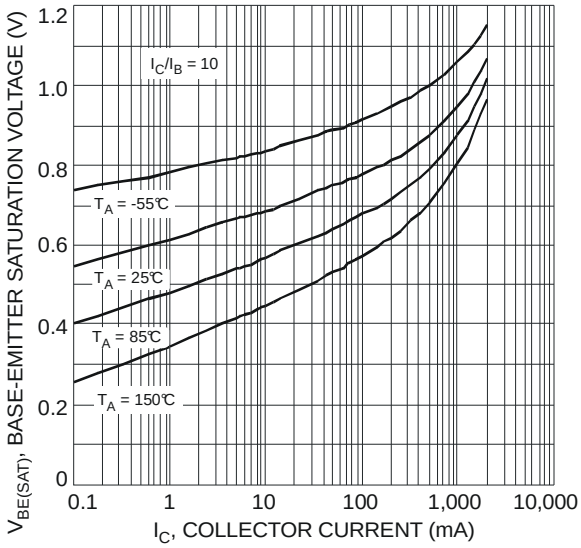

Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

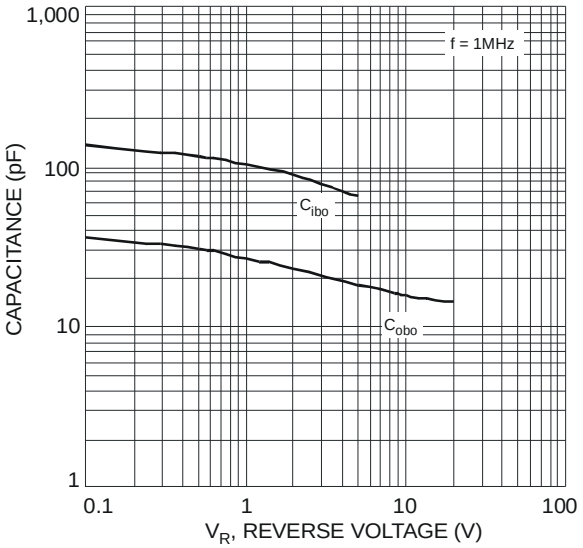

Fig. 7 Typical Capacitance Characteristics

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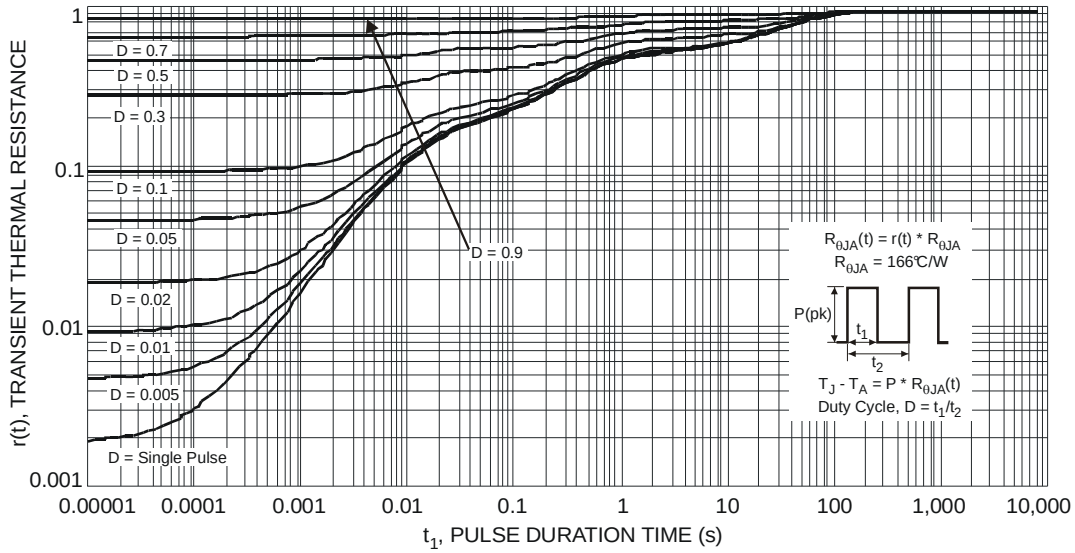


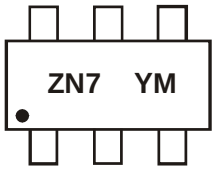
Fig. 8 Transient Thermal Response (Note 3)

Ordering Information (Note 6)

Part Number	Case	Packaging
DSS4220V-7	SOT-563	3000/Tape & Reel

Notes: 5. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

Marking Information



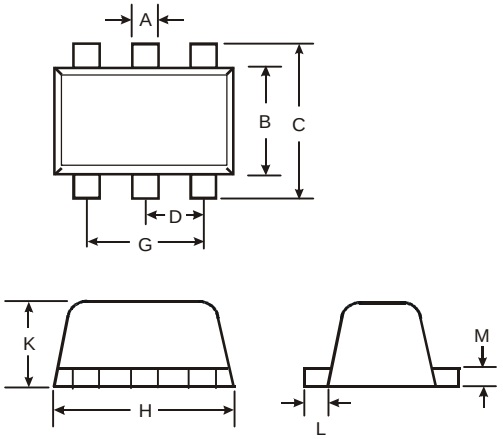
ZN7 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: V = 2008)
M = Month (ex: 9 = September)

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			

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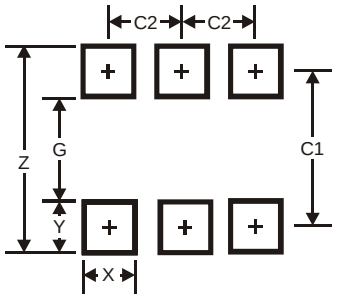
Suggested Pad Layout



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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