

## **Excellent Integrated System Limited**

Stocking Distributor

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[Diodes Incorporated](#)  
[DSS60601MZ4-13](#)

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## Features

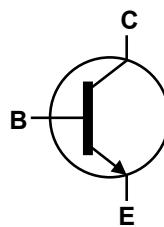
- $BV_{CEO} > 60V$
- $I_C = 6A$  High Continuous Current
- $I_{CM} = 12A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(sat)} < 60mV @ 1A$
- Complementary PNP Type: DSS60600MZ4
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability

## Mechanical Data

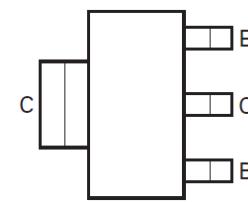
- Case: SOT223
- Case material: molded plastic. "Green" molding compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208
- Weight: 0.115 grams (approximate)



Top View



Device Symbol



Top View  
Pin-Out

## Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape width (mm)	Quantity per reel
DSS60601MZ4-13	AEC-Q101	ZNS66	13	12	2500

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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 <http://www.diodes.com/products/packages.html>

## Marking Information



ZNS66 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y = Last digit of year (ex: 4 = 2014)  
 WW = Week code 01 - 52

**Absolute Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	100	V
Collector-Emitter Voltage	$V_{CEO}$	60	V
Emitter-Base Voltage	$V_{EBO}$	6	V
Continuous Collector Current	$I_C$	6	A
Peak Pulse Collector Current	$I_{CM}$	12	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation	$P_D$	3	W
		2	
		1.2	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	41.7	°C/W
		62.5	
		104	
Thermal Resistance, Junction to Leads (Note 8)	$R_{\theta JL}$	12.9	°C/W
Operating and Storage 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	400	V	C

Notes:

- 5. For a device mounted with the collector lead on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
- 6. Same as note (5), except the device is mounted on 25mm x 25mm 2oz copper.
- 7. Same as note (5), except the device is mounted on minimum recommended pad (MRP) layout.
- 8. Thermal resistance from junction to solder-point (at the end of the collector lead).
- 9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

## Thermal Characteristics and Derating Information

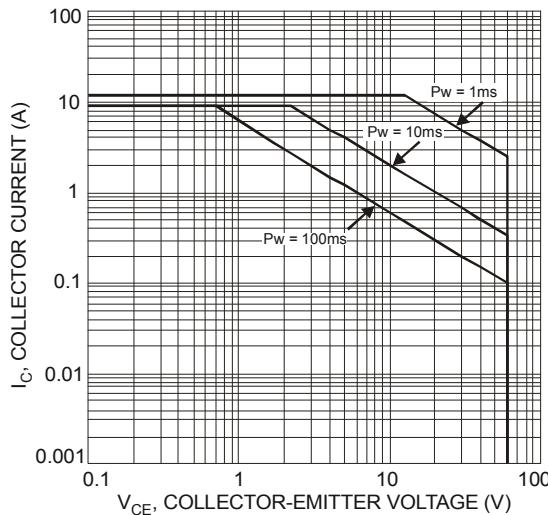
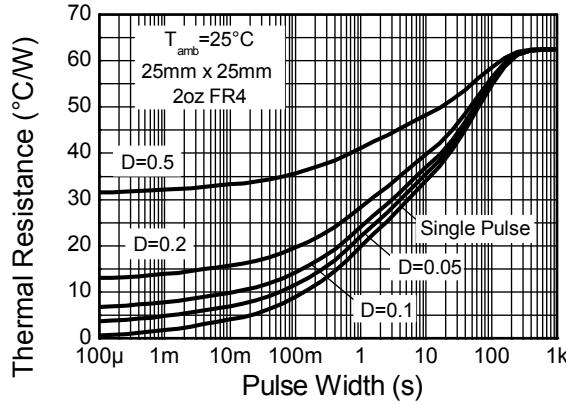
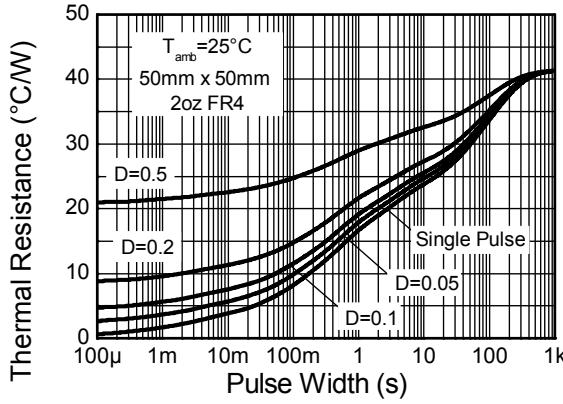


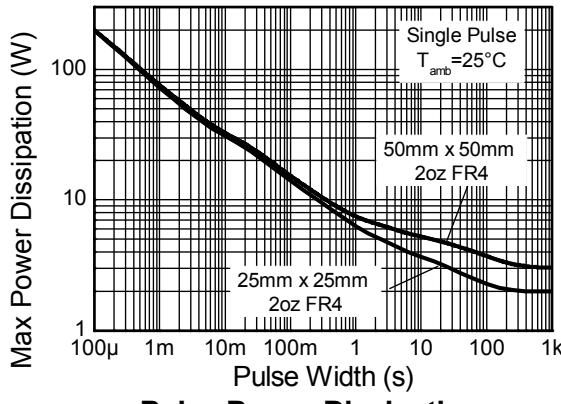
Fig. 2 Typical Collector Current  
vs. Collector-Emitter Voltage (Note 3)



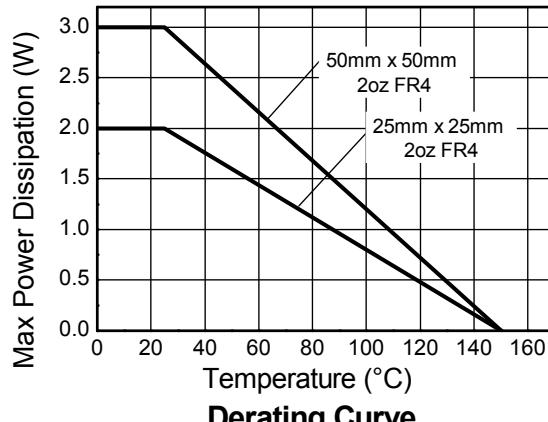
**Transient Thermal Impedance**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



**Derating Curve**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	100	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 10)	$\text{BV}_{\text{CEO}}$	60	—	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	6	—	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cutoff Current	$I_{\text{CBO}}$	—	—	100	nA	$V_{\text{CB}} = 40\text{V}$ , $I_E = 0$
		—	—	50	$\mu\text{A}$	$V_{\text{CB}} = 40\text{V}$ , $I_E = 0$ , $T_J = 150^\circ\text{C}$
Emitter-Base Cutoff Current	$I_{\text{EBO}}$	—	—	100	nA	$V_{\text{EB}} = 6\text{V}$ , $I_C = 0$
<b>ON CHARACTERISTICS (Note 10)</b>						
DC Current Gain	$h_{\text{FE}}$	150	—	—	—	$V_{\text{CE}} = 2\text{V}$ , $I_C = 0.5\text{A}$
		120	—	360		$V_{\text{CE}} = 2\text{V}$ , $I_C = 1\text{A}$
		100	—	—		$V_{\text{CE}} = 2\text{V}$ , $I_C = 2\text{A}$
		50	—	—		$V_{\text{CE}} = 2\text{V}$ , $I_C = 6\text{A}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{SAT})}$	—	—	40	mV	$I_C = 0.1\text{A}$ , $I_B = 2.0\text{mA}$
		—	—	60		$I_C = 1\text{A}$ , $I_B = 100\text{mA}$
		—	80	100		$I_C = 2\text{A}$ , $I_B = 200\text{mA}$
		—	—	220		$I_C = 3\text{A}$ , $I_B = 60\text{mA}$
		—	—	300		$I_C = 6\text{A}$ , $I_B = 600\text{mA}$
Equivalent On-Resistance	$R_{\text{CE}(\text{SAT})}$	—	40	50	$\text{m}\Omega$	$I_E = 2\text{A}$ , $I_B = 200\text{mA}$
Base-Emitter Saturation Voltage	$V_{\text{BE}(\text{SAT})}$	—	—	0.9	V	$I_C = 1\text{A}$ , $I_B = 100\text{mA}$
Base-Emitter Turn-on Voltage	$V_{\text{BE}(\text{ON})}$	—	—	0.9	V	$V_{\text{CE}} = 2\text{V}$ , $I_C = 1\text{A}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Transition Frequency	$f_T$	100	—	—	MHz	$V_{\text{CE}} = 10\text{V}$ , $I_C = 100\text{mA}$ , $f = 100\text{MHz}$
Output Capacitance	$C_{\text{obo}}$	—	26	—	pF	$V_{\text{CB}} = 10\text{V}$ , $f = 1\text{MHz}$
Input Capacitance	$C_{\text{ibo}}$	—	325	—	pF	$V_{\text{EB}} = 5\text{V}$ , $f = 1\text{MHz}$
Turn-On Time	$t_{\text{on}}$	—	87	—	ns	$V_{\text{CC}} = -30\text{v}$ , $I_{\text{CC}} = 150\text{mA}$ $I_{\text{B1}} = -I_{\text{B2}} = 15\text{mA}$
Delay Time	$t_d$	—	41	—	ns	
Rise Time	$t_r$	—	46	—	ns	
Turn-Off Time	$t_{\text{off}}$	—	294	—	ns	
Storage Time	$t_s$	—	250	—	ns	
Fall Time	$t_f$	—	44	—	ns	

Notes: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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

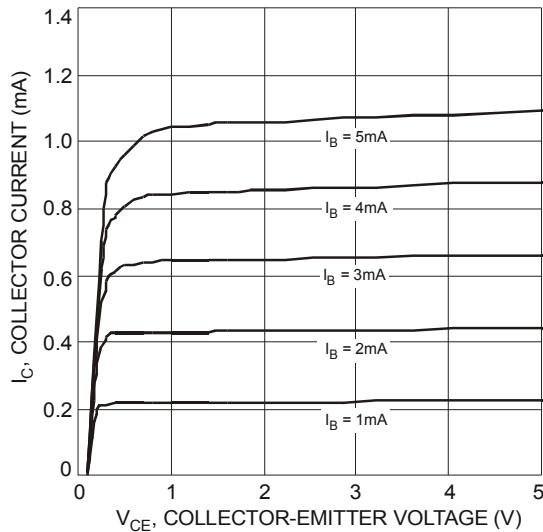


Fig. 3 Typical Collector Current vs. Collector-Emitter Voltage

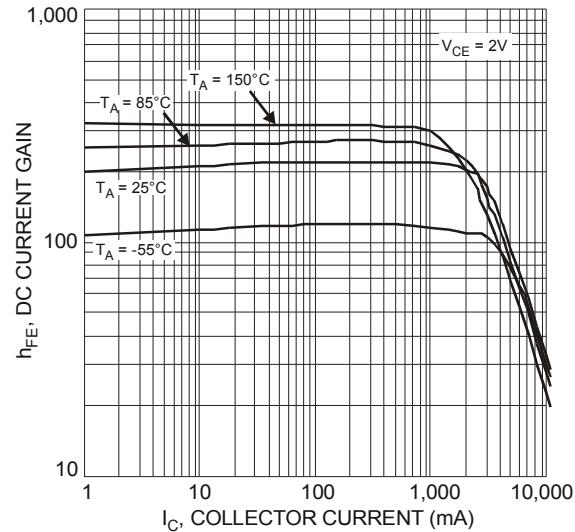


Fig. 4 Typical DC Current Gain vs. Collector Current

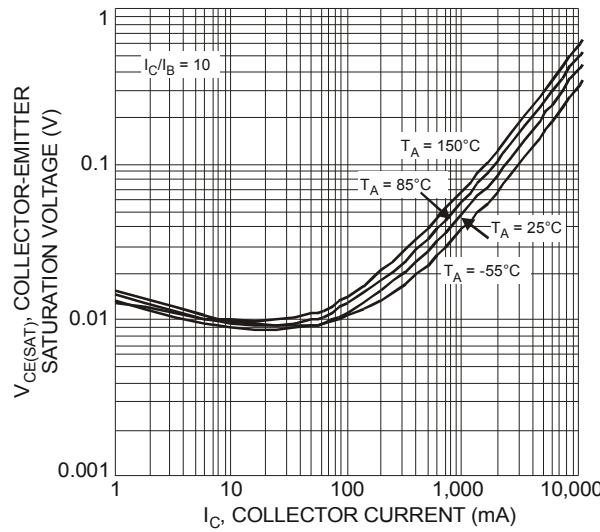


Fig. 5 Typical Collector-Emitter Saturation Voltage vs. Collector Current

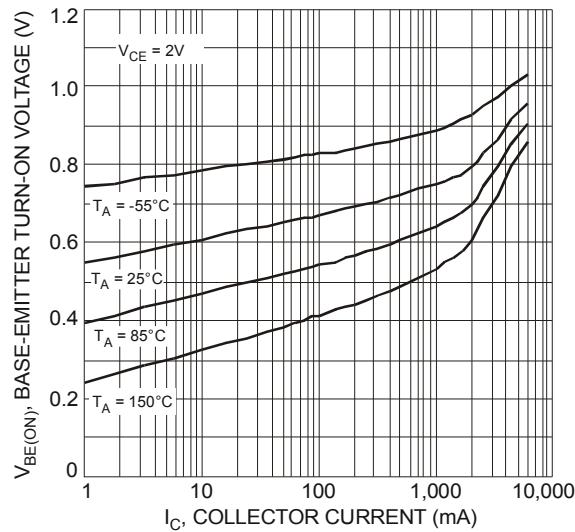


Fig. 6 Typical Base-Emitter Turn-On Voltage vs. Collector Current

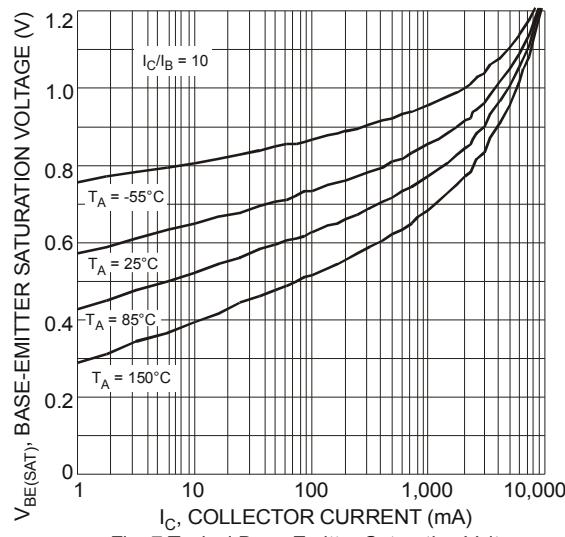


Fig. 7 Typical Base-Emitter Saturation Voltage vs. Collector Current

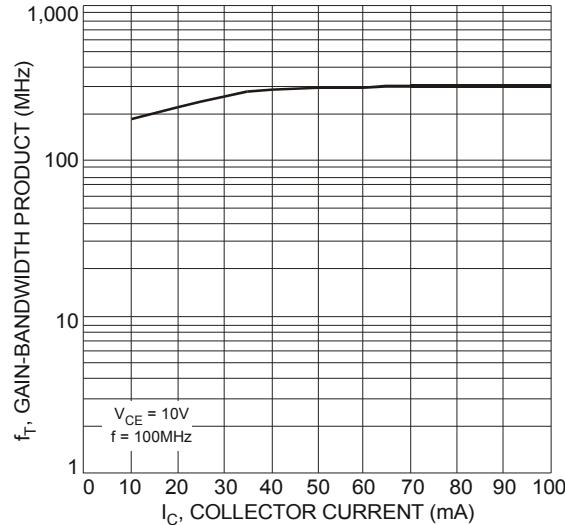


Fig. 9 Typical Gain-Bandwidth Product vs. Collector Current

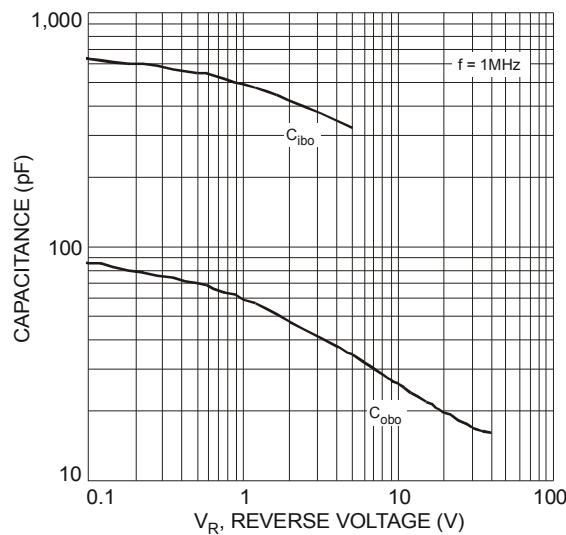
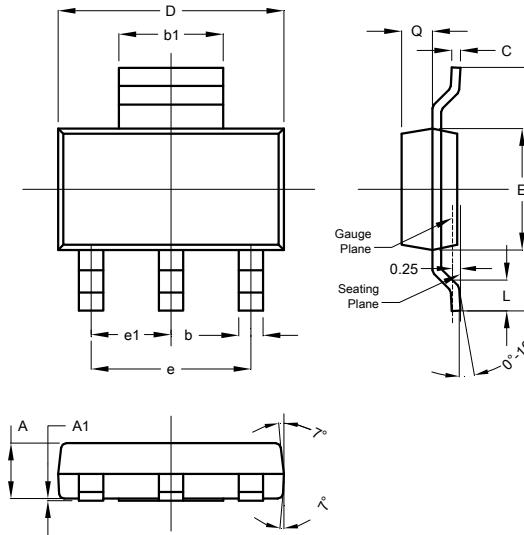


Fig. 8 Typical Capacitance Characteristics

## Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

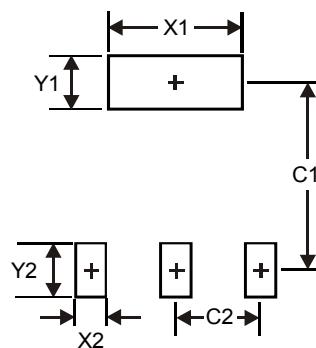


SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89

All Dimensions in mm

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
X1	3.3
X2	1.2
Y1	1.6
Y2	1.6
C1	6.4
C2	2.3

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