

40V PNP HIGH GAIN LOW SATURATION MEDIUM POWER TRANSISTOR IN SOT89

Features

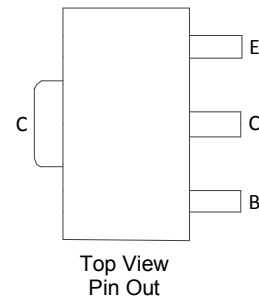
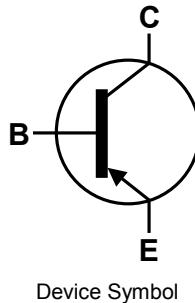
- $BV_{CEO} > -40V$
- $I_C = -5.5A$ High Continuous Current
- Low Saturation Voltage $V_{CE(sat)} < -30mV @ -100mA$
- $R_{sat} = 29m\Omega$ for a Low Equivalent On-Resistance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

Mechanical Data

- Case: SOT89
- 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 ③
- Weight: 0.05 grams (Approximate)

Application

- DC-DC converters
- MOSFET gate drive
- Charging circuits
- Power switches
- Motor control

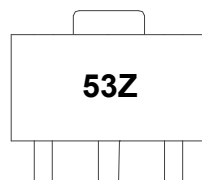


Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
ZXTP2009ZTA	Standard	53Z	7	12	1,000

- 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. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



53Z = Product Type Marking Code

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

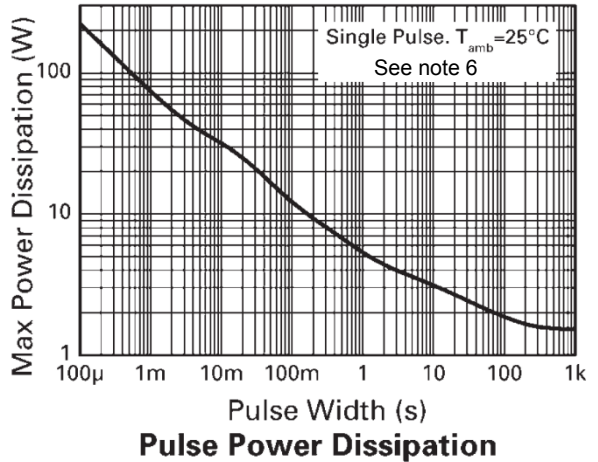
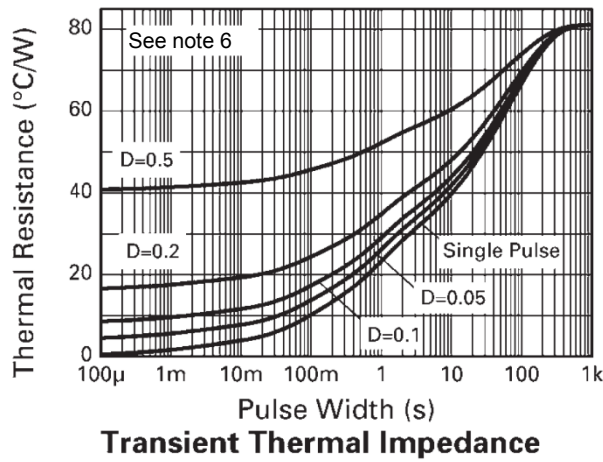
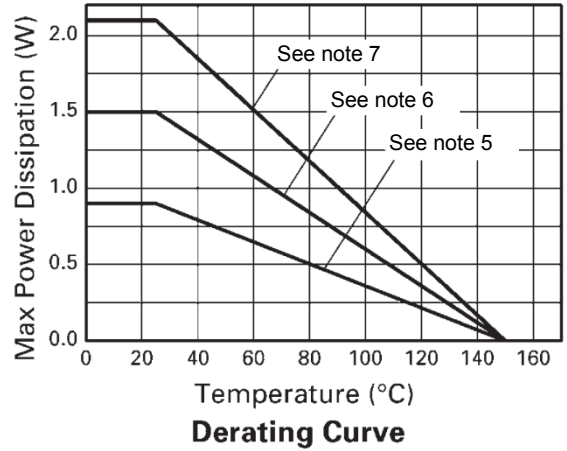
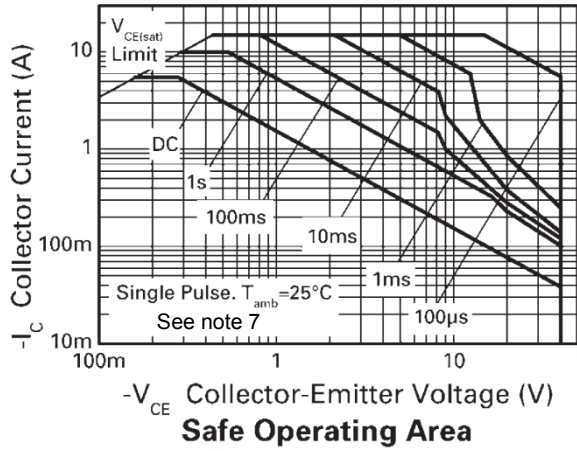
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-50	V
Collector-Base Voltage	V_{CBS}	-50	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-7.5	V
Continuous Collector Current	I_C	-5.5	A
Peak Pulse Collector Current (single pulse)	I_{CM}	-15	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	0.9	W
Linear Derating Factor		7.2	mW/ $^\circ\text{C}$
Power Dissipation (Note 6)	P_D	1.5	W
Linear Derating Factor		12	mW/ $^\circ\text{C}$
Power Dissipation (Note 7)	P_D	2.1	W
Linear Derating Factor		16.8	mW/ $^\circ\text{C}$
Power Dissipation (Note 8)	P_D	3	W
Linear Derating Factor		24	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	139	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	83	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient (Note 7)	$R_{\theta JA}$	60	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient (Note 8)	$R_{\theta JA}$	42	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
5. For a device surface mounted on 15mm x 15mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; device measured when operating in steady state condition.
 6. Same as note (5), except the device is mounted on 25mm x 25mm x 0.6mm single sided 1oz weight copper.
 7. Same as note (5), except the device is mounted on 50mm x 50mm x 0.6mm single sided 1oz weight copper.
 8. Same as note (5), except the device is measured at $t < 5$ seconds.

Thermal Characteristics and Derating Information

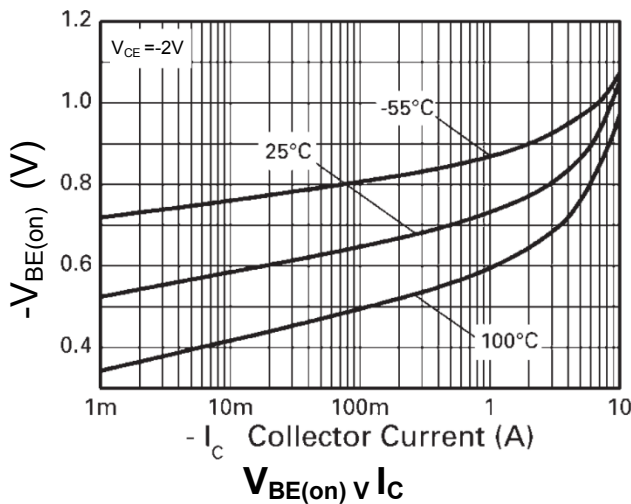
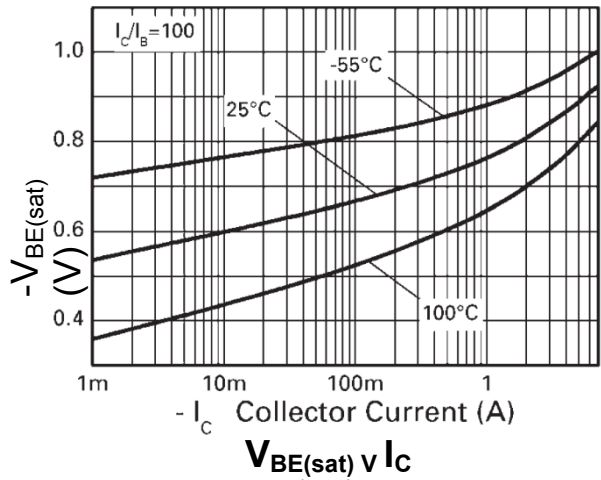
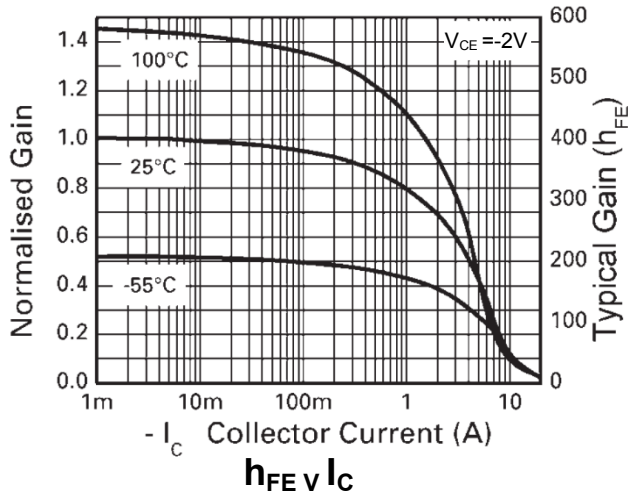
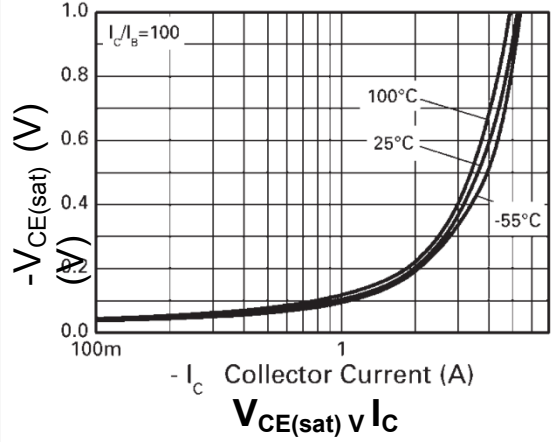
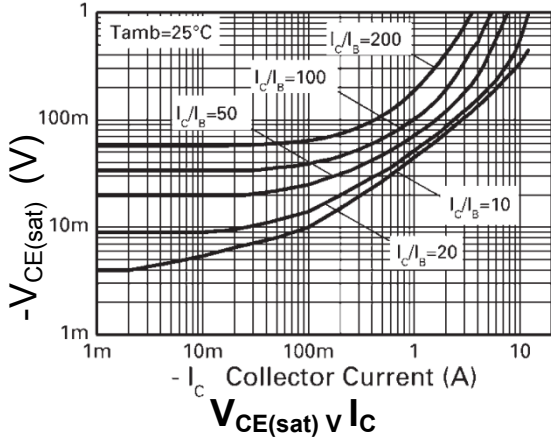


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-50	-90	—	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage	BV_{CES}	-50	-90	—	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	-40	-58	—	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	BV_{EBO}	-7.5	-8.3	—	V	$I_C = -100\mu\text{A}$
Collector-Base Cut-Off Current	I_{CBO}	—	-1	-20	nA	$V_{CB} = -40\text{V}$
Collector-Emitter Cut-Off Current	I_{CES}	—	-1	-20	nA	$V_{CB} = -32\text{V}$
Emitter-Base Cut-Off Current	I_{EBO}	—	-1	-20	nA	$V_{EB} = -6\text{V}$
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(sat)}$	—	-15 -44 -50 -120 -70 -125 -130 -162	-30 -60 -70 -165 -80 -175 -175 -185	mV	$I_C = -0.1\text{A}, I_B = -10\text{mA}$ $I_C = -1\text{A}, I_B = -100\text{mA}$ $I_C = -1\text{A}, I_B = -50\text{mA}$ $I_C = -1\text{A}, I_B = -10\text{mA}$ $I_C = -2\text{A}, I_B = -200\text{mA}$ $I_C = -2\text{A}, I_B = -40\text{mA}$ $I_C = -3.5\text{A}, I_B = -175\text{mA}$ $I_C = -5.5\text{A}, I_B = -550\text{mA}$
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(sat)}$	—	-820 -1000	-900 -1075	mV	$I_C = -2\text{A}, I_B = -40\text{mA}$ $I_C = -5.5\text{A}, I_B = -550\text{mA}$
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(on)}$	—	-778 -869	-850 -950	mV	$I_C = -2\text{A}, V_{CE} = -2\text{V}$ $I_C = -5.5\text{A}, V_{CE} = -2\text{V}$
DC Current Gain (Note 9)	h_{FE}	200 200 175 110	390 350 290 175	— 550 — —	—	$I_C = -10\text{mA}, V_{CE} = -2\text{V}$ $I_C = -0.5\text{A}, V_{CE} = -2\text{V}$ $I_C = -2\text{A}, V_{CE} = -2\text{V}$ $I_C = -5.5\text{A}, V_{CE} = -2\text{V}$
Transitional frequency	f_T	—	152	—	MHz	$I_C = -50\text{mA}, V_{CE} = -10\text{V}, f = 100\text{MHz}$
Output Capacitance	C_{obo}	—	53	—	pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$
Switching times	t_d	—	18	—	ns	$I_C = -1\text{A}, V_{CC} = -10\text{V}, I_{B1} = -I_{B2} = -100\text{mA}$
	t_r		17			
	t_s		325			
	t_f		60			
Switching times	t_d	—	55	—	ns	$I_C = -2\text{A}, V_{CC} = -30\text{V}, I_{B1} = -I_{B2} = -20\text{mA}$
	t_r		107			
	t_s		264			
	t_f		103			

Note: 9. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

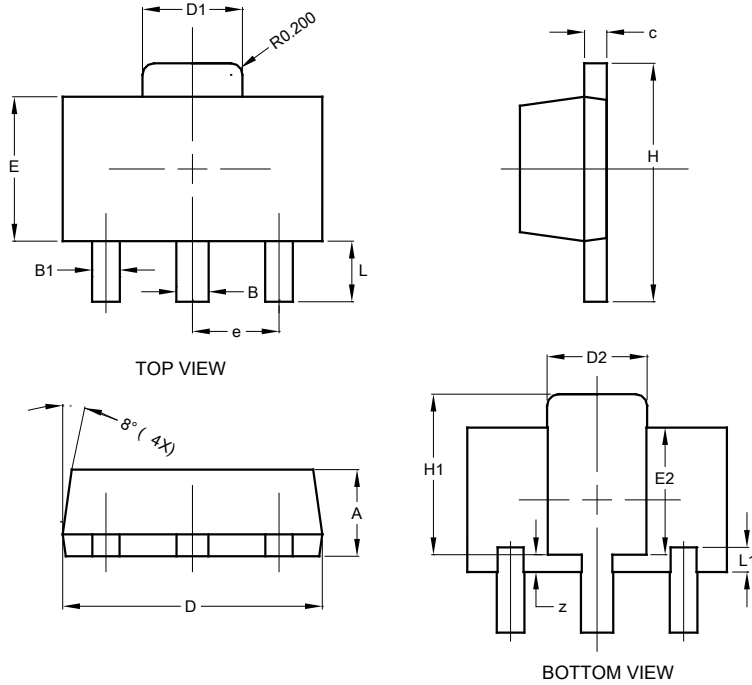
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

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

SOT89

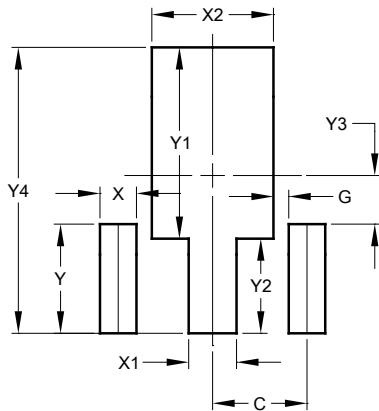


SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			

Suggested Pad Layout

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

SOT89



Dimensions	Value (in mm)
C	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530

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