400V NPN HIGH-VOLTAGE TRANSISTOR IN SOT89

Features

- BV_{CEO} > 400V
- I_C = 225mA Continuous Collector Current
- Low Saturation Voltage $V_{CE(sat)}$ < 200mV @ 20mA
- Complementary PNP Type: FCX558Q
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The FCX458Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

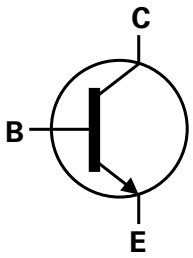
Mechanical Data

- Package: SOT89
- Package 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 e3
- Weight: 0.055 grams (Approximate)

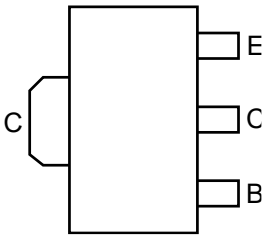
SOT89



Top View



Equivalent Circuit



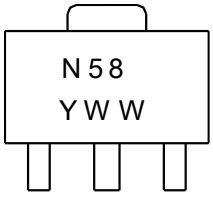
Top View
Pinout

Ordering Information (Note 4)

Orderable Part Number	Marking	Package	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
FCX458QTA	N58	SOT89	7	12	1,000	Reel

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



N58 = Product Type Marking Code
YWW = Date Code Marking
Y = Last Digit of Year (ex: 6 = 2026)
WW = Week Code (01 to 53)

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Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	400	V
Collector-Emitter Voltage	V_{CEO}	400	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	225	mA
Peak Pulse Current	I_{CM}	500	mA
Base Current	I_B	200	mA

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	0.7	W
	(Note 6)		1	
	(Note 7)		1.5	
	(Note 8)		2	
Thermal Resistance, Junction to Ambient Air	(Note 5)	$R_{\theta JA}$	178	°C/W
	(Note 6)		125	
	(Note 7)		83	
	(Note 8)		60	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	22	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 10)

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 exposed collector pad on minimum recommended pad layout (MRP) 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady state.
6. Same as Note 5, except the device is mounted with the exposed collector pad on 15mm x 15mm 1oz copper.
7. Same as Note 5, except the device is mounted with the exposed collector pad on 25mm x 25mm 1oz copper.
8. Same as Note 5, except the device is mounted with the exposed collector pad on 50mm x 50mm 1oz copper.
9. Thermal resistance from junction to solder-point (on the exposed collector pad).
10. Refer to JEDEC specifications JESD22-A114 and JESD22-A115.

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Thermal Characteristics and Derating Information

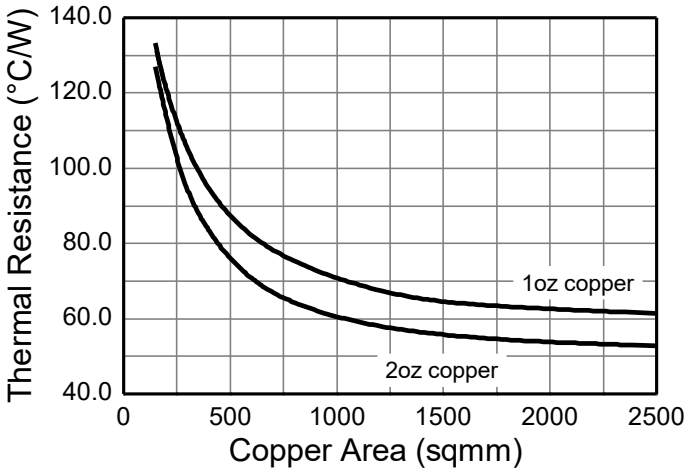


Figure 1. Thermal Impedance

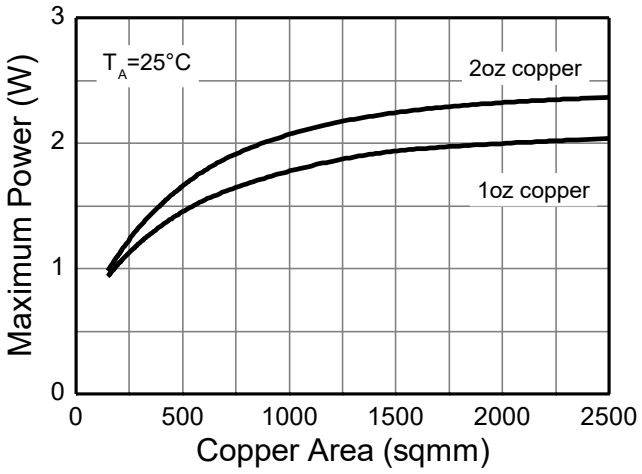


Figure 2. Power Dissipation

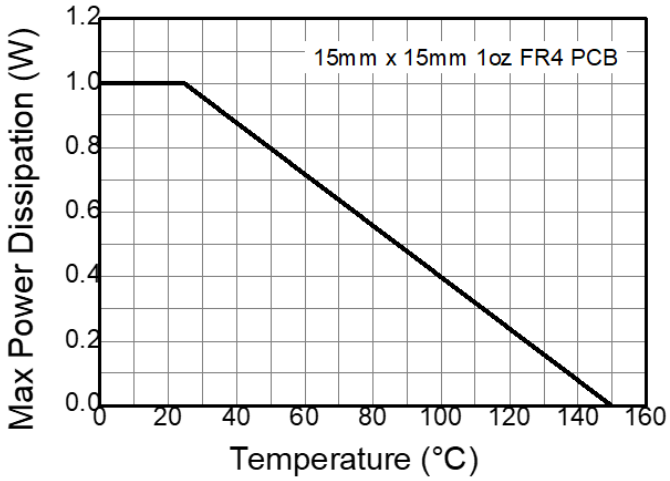


Figure 3. Derating Curve

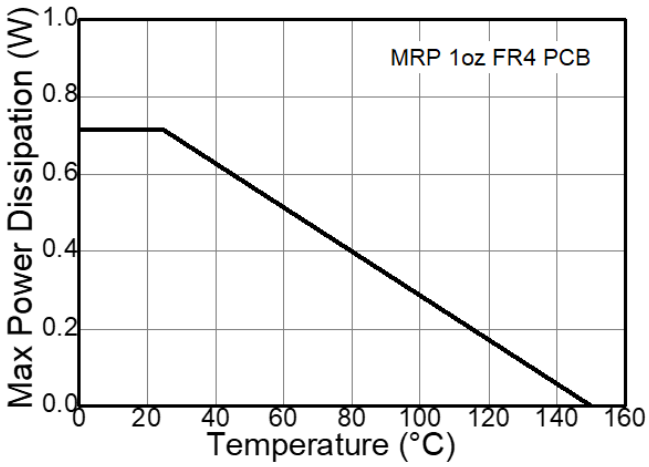


Figure 4. Derating Curve

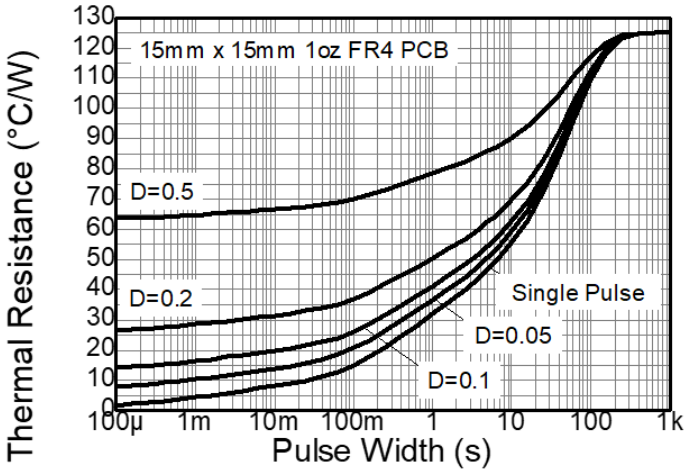


Figure 5. Transient Thermal Impedance

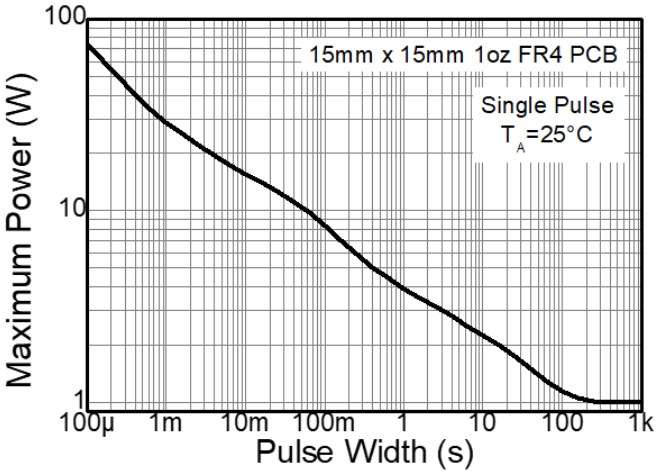


Figure 6. Pulse Power Dissipation

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Thermal Characteristics and Derating Information (continued)

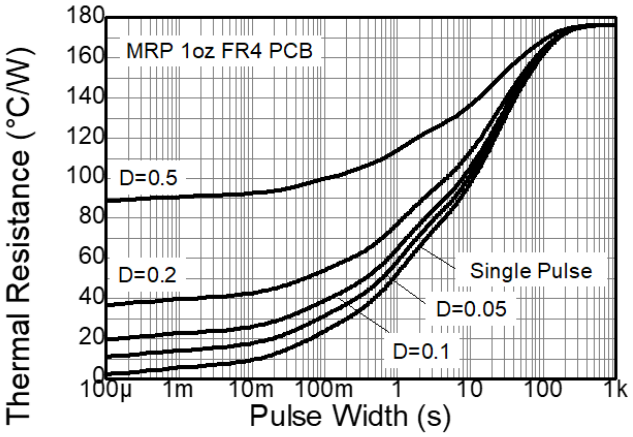


Figure 7. Transient Thermal Impedance

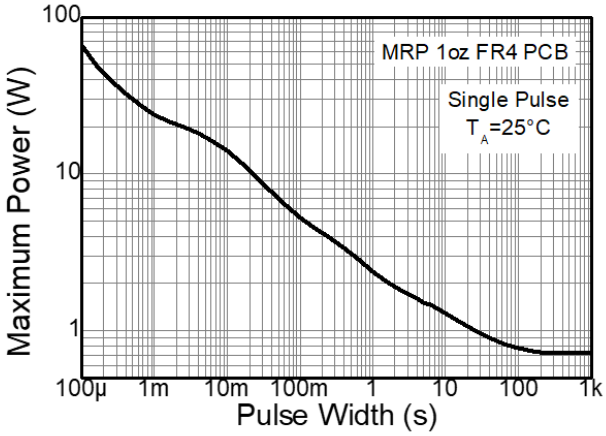


Figure 8. Pulse Power Dissipation

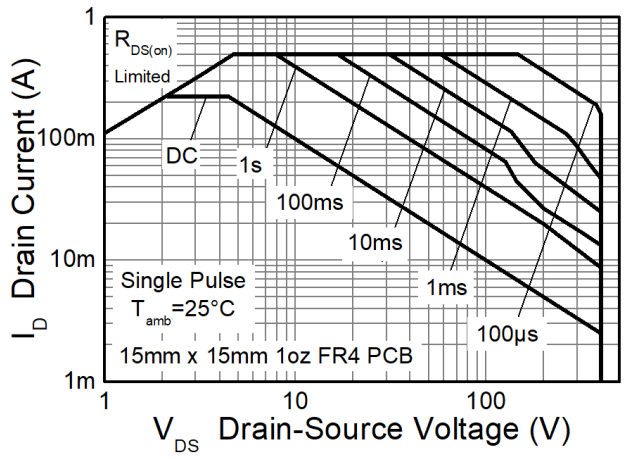


Figure 9. Safe Operating Area

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Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	400	550	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage	BV_{CES}	400	550	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	400	450	—	V	I_C = 1mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.1	—	V	I_E = 100µA
Collector-Base Cutoff Current	I_{CBO}	—	1	100	nA	V_{CB} = 320V
Collector Cutoff Current	I_{CES}	—	2	100	nA	V_{CES} = 320V
Emitter Cutoff Current	I_{EBO}	—	1	20	nA	V_{EB} = 6V
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	— —	— —	200 500	mV	I_C = 20mA, I_B = 2mA I_C = 50mA, I_B = 6mA
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	—	—	900	mV	I_C = 50mA, I_B = 5mA
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	—	—	900	mV	I_C = 50mA, V_{CE} = 10V
DC Current Gain (Note 11)	h_{FE}	100 100 15	—	300	—	I_C = 1mA, V_{CE} = 10V I_C = 50mA, V_{CE} = 10V I_C = 100mA, V_{CE} = 10V
Transitional Frequency	f_T	50	—	—	MHz	I_C = 10mA, V_{CE} = 20V, f = 20MHz
Output Capacitance	C_{obo}	—	—	5	pF	V_{CB} = 20V, f = 1MHz
Turn-On Time	t_{on}	—	135	—	ns	I_C = 50mA, V_{CE} = 100V, I_{B1} = 5mA, I_{B2} = -10mA
Turn-Off Time	t_{off}	—	2260	—	ns	

Note: 11. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

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Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

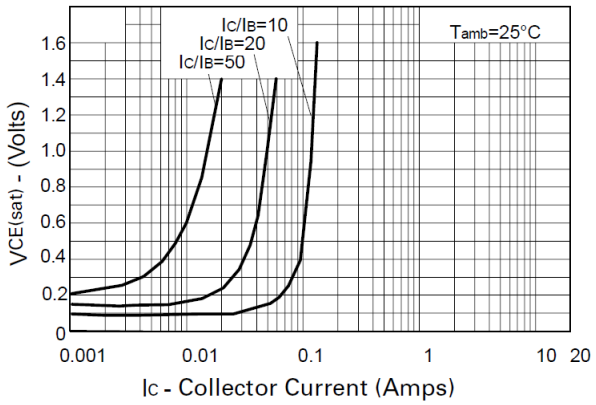


Figure 10. $V_{CE(sat)}$ vs. I_C

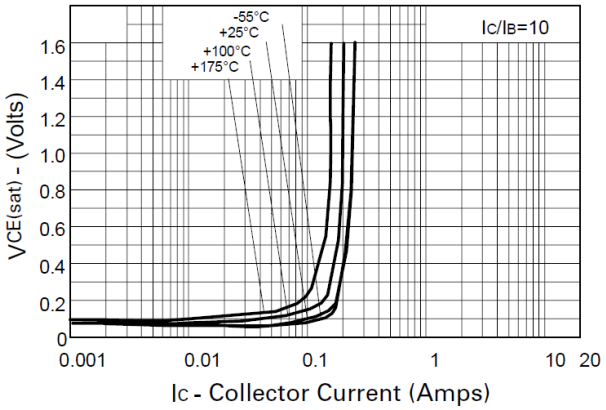


Figure 11. $V_{CE(sat)}$ vs. I_C

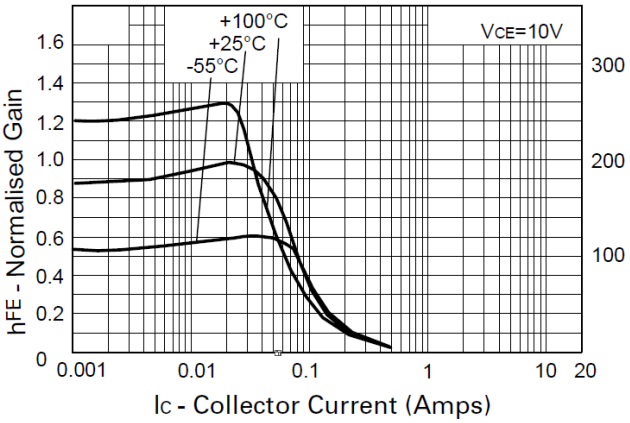


Figure 12. h_{FE} vs. I_C

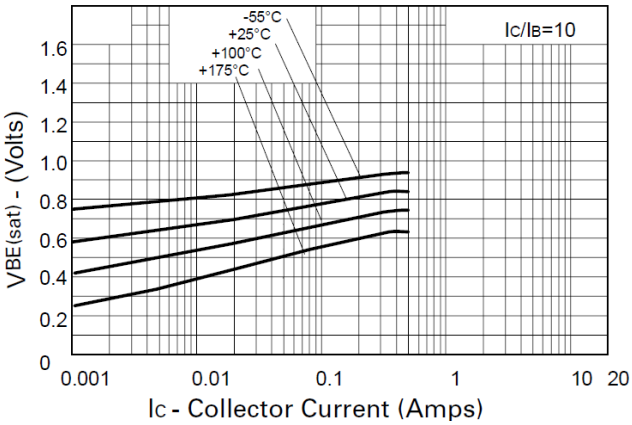


Figure 13. $V_{BE(sat)}$ vs. I_C

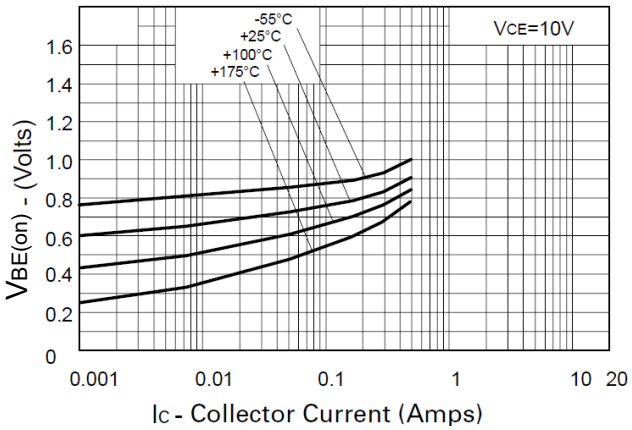


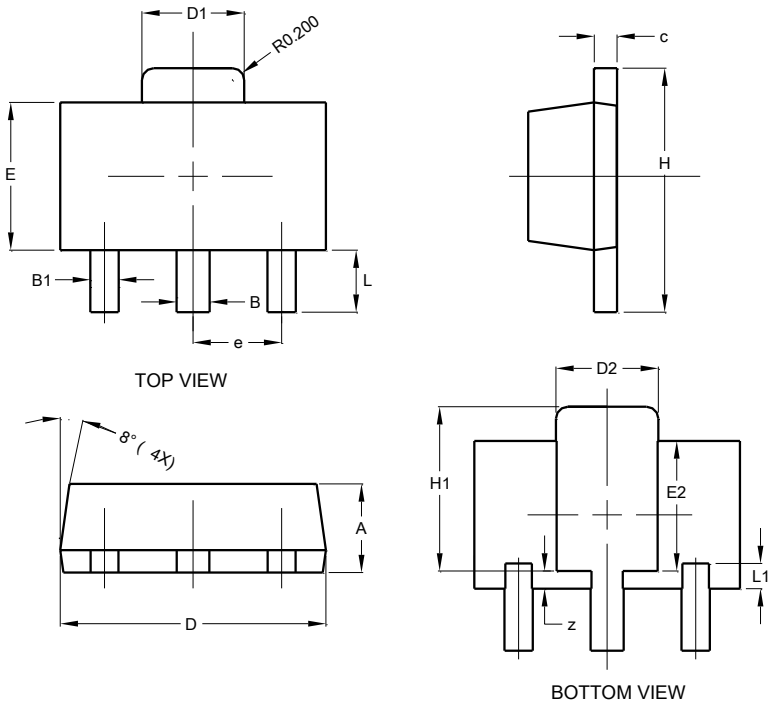
Figure 14. $V_{BE(on)}$ vs. I_C

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Package Outline Dimensions

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

SOT89

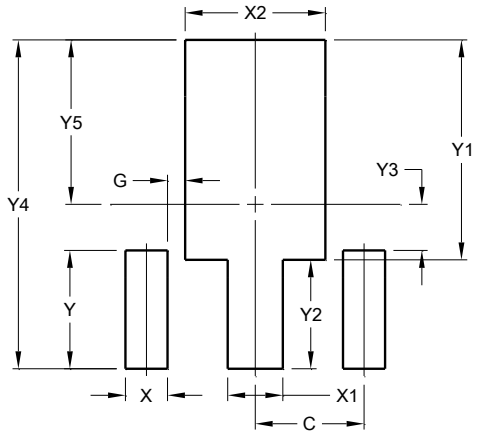


SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.00	0.527	0.327
z	0.20	0.40	0.30
All Dimensions 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	1.630
Y1	3.030
Y2	1.500
Y3	0.635
Y4	4.530
Y5	2.265

Notes:
12. The suggested land pattern dimensions have been provided for reference only, as actual pad layouts may vary depending on application. These dimensions may be modified based on user equipment capability or fabrication criteria. A more robust pattern may be desired for wave soldering and is calculated by adding 0.2mm to the 'Z' dimension. For further information, please reference document IPC-7351A, Naming Convention for Standard SMT Land Patterns, and for International grid details, please see document IEC, Publication 97.
13. For high-voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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