ZXTC4591AMC

COMPLEMENTARY 40V HIGH PERFORMANCE TRANSISTOR

Features and Benefits

NPN Transistor
- BV_{CEO} > 40V
- I_C = 3A Continuous Collector Current
- Low Saturation Voltage (500mV max @ 1A)
- R_{SAT} = 195mΩ for a low equivalent On-Resistance

PNP Transistor
- BV_{CEO} > -40V
- I_C = -3A Continuous Collector Current
- Low Saturation Voltage (-500mV max @ -1A)
- R_{SAT} = 350mΩ for a low equivalent On-Resistance

- h_{FE} characterized up to 2A for high current gain hold up
- Low profile 0.8mm high package for thin applications
- $R_{\theta JA}$ efficient, 40% lower than SOT26
- $6mm^2$ footprint, 50% smaller than TSOP6 and SOT26
- **Lead-Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

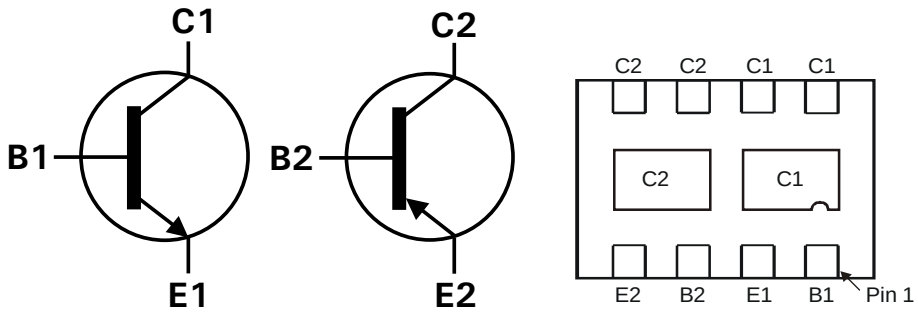
Mechanical Data

- Case: DFN3020B-8
- Case material: Molded Plastic. "Green" Molding Compound.
- Terminals: Pre-Plated NiPdAu leadframe.
- Nominal package height: 0.8mm
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Weight: 0.013 grams (approximate)

Applications

- DC – DC Converters
- Charging circuits
- Power switches
- LED Backlighting circuits
- Motor control
- Portable applications

DFN3020B-8



Top View | Bottom View | NPN Transistor | PNP Transistor | Bottom View Pin Out

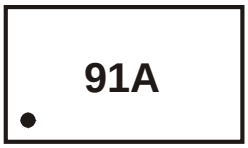
Equivalent Circuit

Ordering Information (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTC4591AMCTA	91A	7	8	3000

Notes: 1. No purposefully added lead.
2. Diodes Inc's "Green" Policy can be found on our website at http://www.diodes.com
3. For Packaging Details, go to our website at http://www.diodes.com.

Marking Information



91A = Product type marking code
Top view, dot denotes pin 1

Maximum Ratings @ T_A = 25°C unless otherwise specified

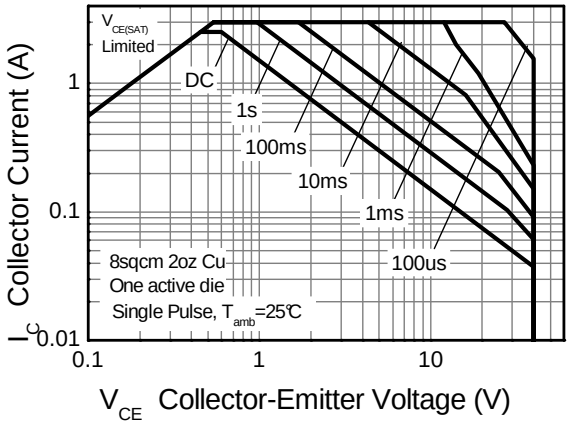
Parameter		Symbol	NPN	PNP	Unit
Collector-Base Voltage		V_{CBO}	40	-40	V
Collector-Emitter Voltage		V_{CEO}	40	-40	
Emitter-Base Voltage		V_{EBO}	5	-5	
Peak Pulse Current		I_{CM}	3	-3	A
Continuous Collector Current	(Notes 4 & 7)	I_C	2	-1.5	
	(Notes 5 & 7)		2.5	-2	
Base Current		I_B	300		mA

Thermal Characteristics @ T_A = 25°C unless otherwise specified

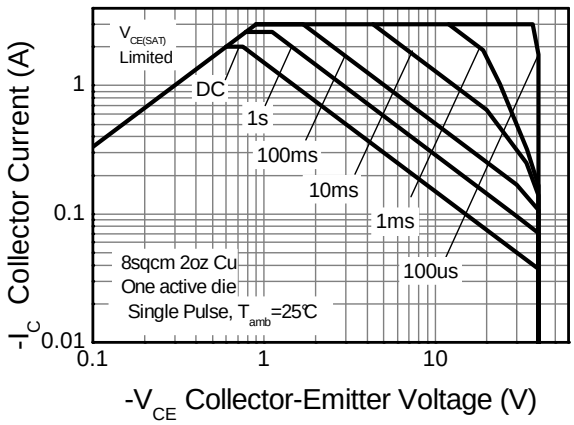
Characteristic		Symbol	NPN	PNP	Unit
Power Dissipation Linear Derating Factor	(Notes 4 & 7)	P_D	1.5 12		W mW/°C
	(Notes 5 & 7)		2.45 19.6		
	(Notes 6 & 7)		1.13 8		
	(Notes 6 & 8)		1.7 13.6		
Thermal Resistance, Junction to Ambient	(Notes 4 & 7)	$R_{\theta JA}$	83.3		°C/W
	(Notes 5 & 7)		51.0		
	(Notes 6 & 7)		111		
	(Notes 6 & 8)		73.5		
Thermal Resistance, Junction to Lead	(Notes 7 & 9)	$R_{\theta JL}$	17.1		
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150		°C

Notes:
4. For a dual device surface mounted on 28mm x 28mm (8cm^2) FR4 PCB with high coverage of single sided 2 oz copper, in still air conditions; the device is measured when operating in a steady-state condition. The heatsink is split in half with the exposed collector pads connected to each half.
5. Same as note (3), except the device is measured at t <5 sec.
6. Same as note (3), except the device is surface mounted on 31mm x 31mm (10cm^2) FR4 PCB with high coverage of single sided 1oz copper.
7. For a dual device with one active die.
8. For dual device with 2 active die running at equal power.
9. Thermal resistance from junction to solder-point (at the end of the collector lead).

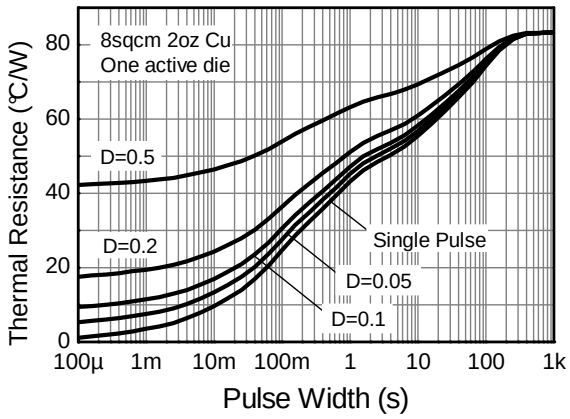
Thermal Characteristics



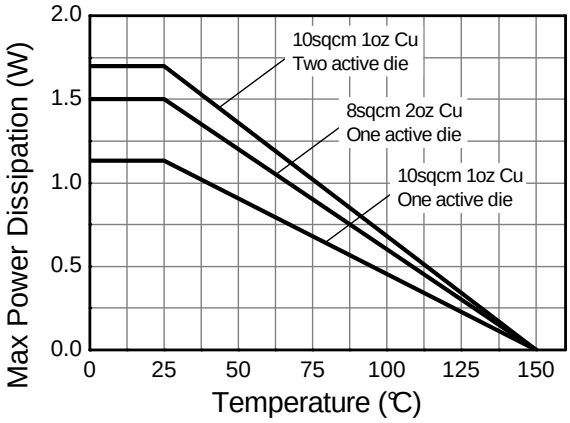
NPN Safe Operating Area



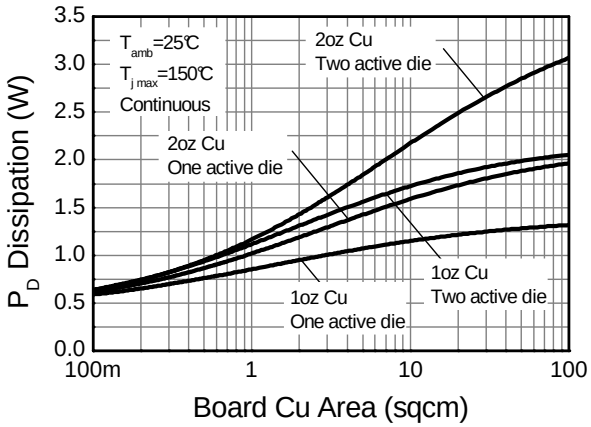
PNP Safe Operating Area



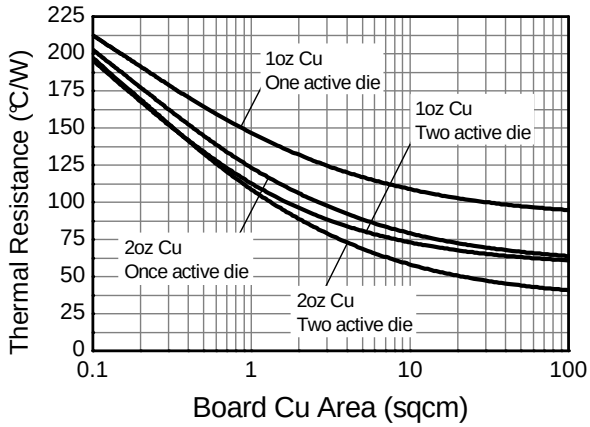
Transient Thermal Impedance



Derating Curve



Power Dissipation v Board Area



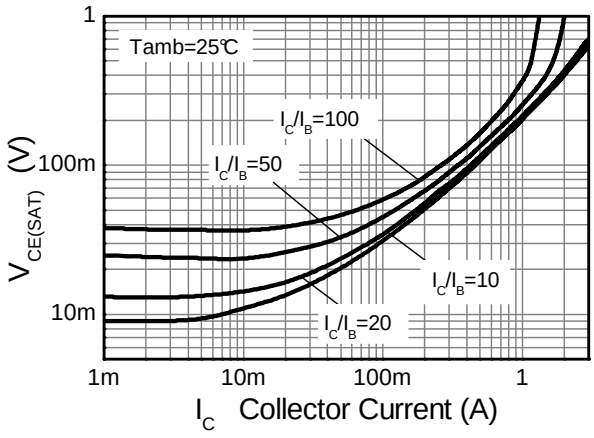
Thermal Resistance v Board Area

NPN - Electrical Characteristics @ T_A = 25°C unless otherwise specified

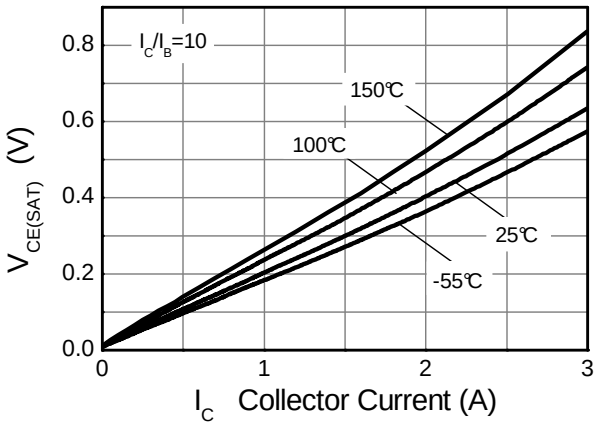
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	40	-	-	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	40	-	-	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	5	-	-	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	-	-	100	nA	V_{CB} = 30V
Emitter Cutoff Current	I_{EBO}	-	-	100	nA	V_{EB} = 4V
Collector Emitter Cutoff Current	I_{CES}	-	-	100	nA	V_{CE} = 30V
Static Forward Current Transfer Ratio (Note 10)	h_{FE}	300 300 200 35	- - - -	- 900 - -	-	I_C = 1mA, V_{CE} = 5V I_C = 500mA, V_{CE} = 5V I_C = 1A, V_{CE} = 5V I_C = 2A, V_{CE} = 5V
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	- -	- -	300 500	mV	I_C = 0.5A, I_B = 50mA I_C = 1A, I_B = 100mA
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(on)}$	-	-	1.0	V	I_C = 1A, V_{CE} = 5V
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	-	-	1.1	V	I_C = 1A, I_B = 100mA
Output Capacitance	C_{obo}	-	-	10	pF	V_{CB} = 10V, f = 1MHz
Transition Frequency	f_T	150	-	-	MHz	V_{CE} = 10V, I_C = 50mA, f = 100MHz

Notes: 10. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

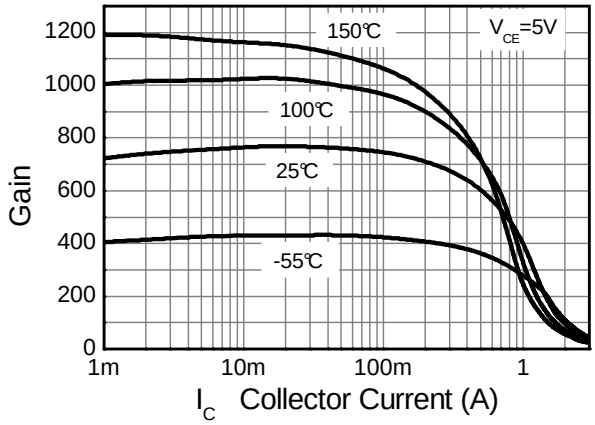
NPN - Typical Electrical Characteristics



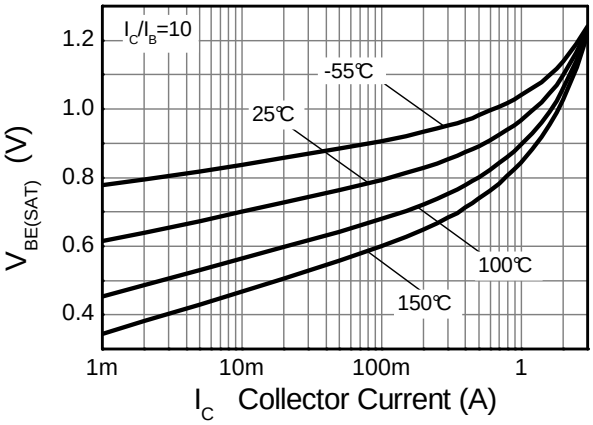
$V_{CE(SAT)}$ v I_C



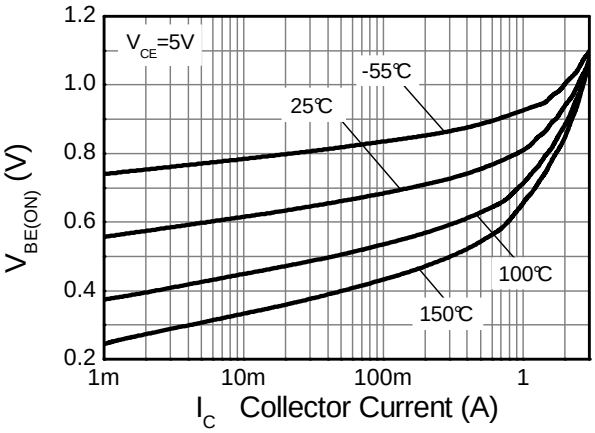
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C



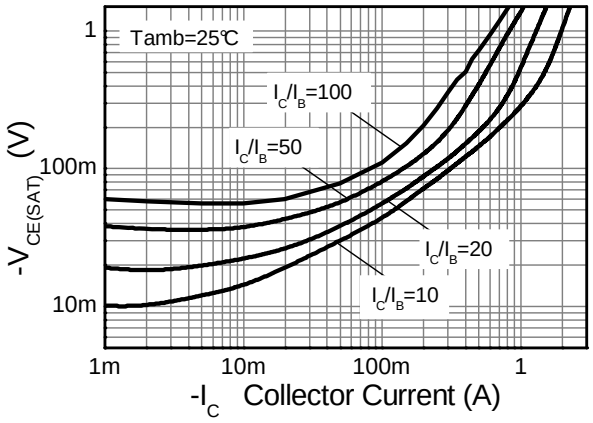
$V_{BE(ON)}$ v I_C

PNP - Electrical Characteristics @T_A = 25°C unless otherwise specified

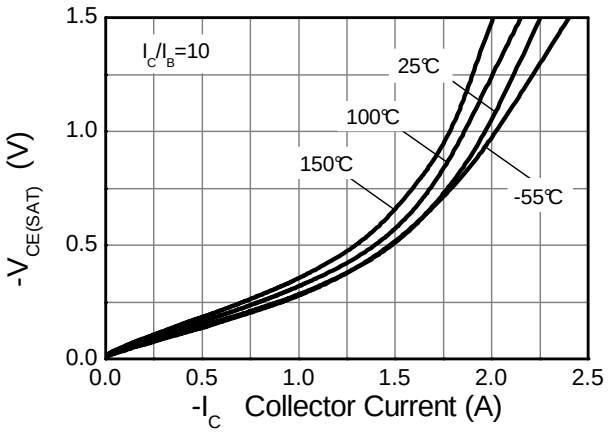
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-40	-	-	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	-40	-	-	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-5	-	-	V	I_E = -100µA
Collector Cutoff Current	I_{CBO}	-	-	-100	nA	V_{CB} = -30V
Emitter Cutoff Current	I_{EBO}	-	-	-100	nA	V_{EB} = -4V
Collector Emitter Cutoff Current	I_{CES}	-	-	-100	nA	V_{CE} = -30V
Static Forward Current Transfer Ratio (Note 11)	h_{FE}	300 300 250 160 30	- - - - -	- 800 - - -	-	I_C = -1mA, V_{CE} = -5V I_C = -100mA, V_{CE} = -5V I_C = -500mA, V_{CE} = -5V I_C = -1A, V_{CE} = -5V I_C = -2A, V_{CE} = -5V
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	- - -	- - -	-200 -350 -500	mV	I_C = -0.1A, I_B = -1mA I_C = -0.5A, I_B = -20mA I_C = -1.0A, I_B = -100mA
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	-	-	-1.0	V	I_C = -1A, V_{CE} = -5V
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	-	-	-1.1	V	I_C = -1A, I_B = -50mA
Output Capacitance	C_{obo}	-	-	10	pF	V_{CB} = -10V, f = 1MHz
Transition Frequency	f_T	150	-	-	MHz	V_{CE} = -10V, I_C = -50mA, f = 100MHz

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

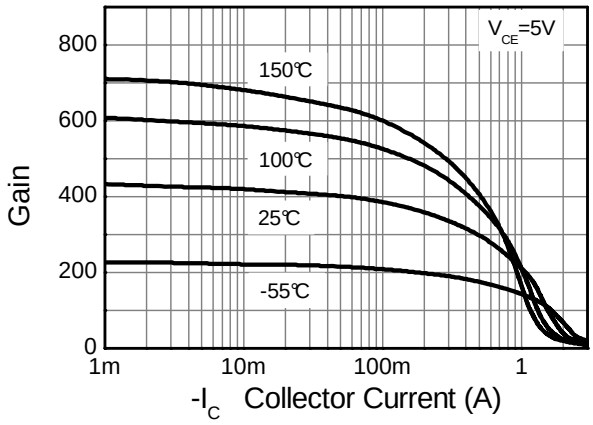
PNP - Typical Electrical Characteristics



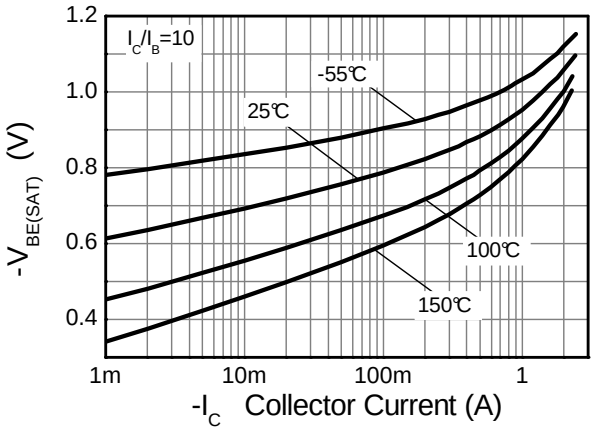
$V_{CE(SAT)}$ v I_C



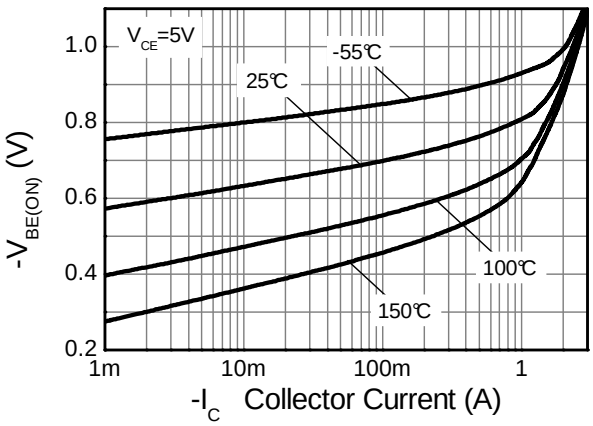
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C

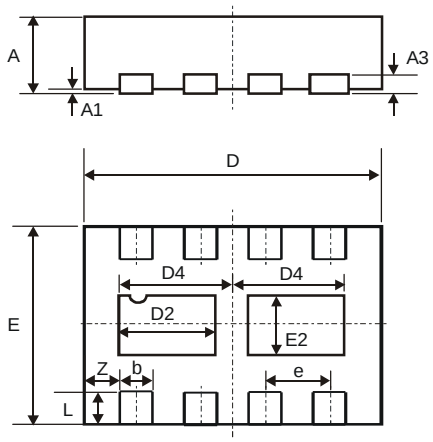


$V_{BE(SAT)}$ v I_C



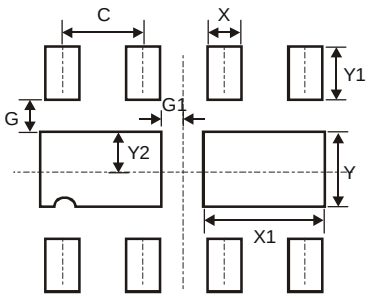
$V_{BE(ON)}$ v I_C

Package Outline Dimensions



DFN3020B-8			
Dim	**Min**	**Max**	**Typ**
A	0.77	0.83	0.80
A1	0	0.05	0.02
A3	-	-	0.15
b	0.25	0.35	0.30
D	2.95	3.075	3.00
D2	0.82	1.02	0.92
D4	1.01	1.21	1.11
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.43	0.63	0.53
L	0.25	0.35	0.30
Z	-	-	0.375
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	0.650
G	0.285
G1	0.090
X	0.400
X1	1.120
Y	0.730
Y1	0.500
Y2	0.365

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