



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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### Features and Benefits

- Pd = 1.1W in SOT26 Package

#### NPN Transistor

- $BV_{CEO} > 15V$
- $I_C = 1.5A$  Continuous Collector Current
- Low Saturation Voltage (100mV max @ 1A)
- $R_{SAT} = 135m\Omega @ 1.5A$  for a Low Equivalent On-Resistance

#### PNP Transistor

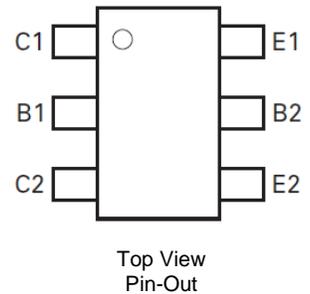
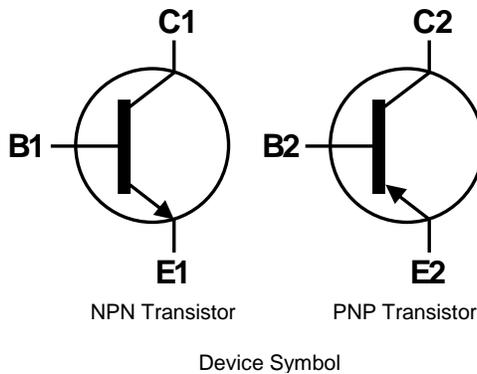
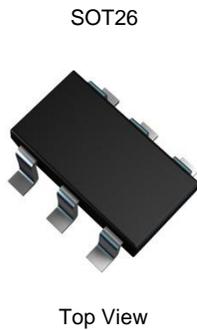
- $BV_{CEO} > -12V$
- $I_C = -1.25A$  Continuous Collector Current
- Low Saturation Voltage (-140mV max @ -1A)
- $R_{SAT} = 150m\Omega @ 1.2A$  for a Low Equivalent On-Resistance

### Mechanical Data

- Case: SOT26
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification 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: 0.015 grams (Approximate)

### Applications

- Efficient Driving Functions including Motors, Lamps, Relays and Solenoids
- High Output Current Switches



### NPN - Absolute Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	15	V
Collector-Emitter Voltage	V <sub>CEO</sub>	15	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Peak Pulse Current	I <sub>CM</sub>	5	A
Continuous Collector Current	I <sub>C</sub>	1.5	A
Base Current	I <sub>B</sub>	200	mA

### PNP - Absolute Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	-12	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-12	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Peak Pulse Current	I <sub>CM</sub>	-3	A
Continuous Collector Current	I <sub>C</sub>	-1.25	A
Base Current	I <sub>B</sub>	-200	mA

### Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	1.1	W
		8.8	
Linear Derating Factor		1.7	mW/°C
		13.6	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	125	°C/W
		45	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	95	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-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

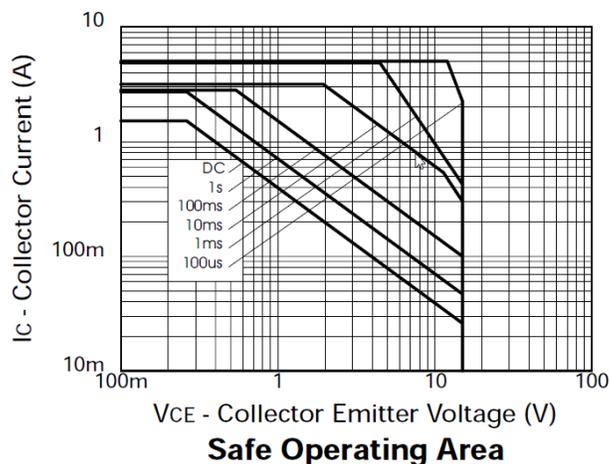
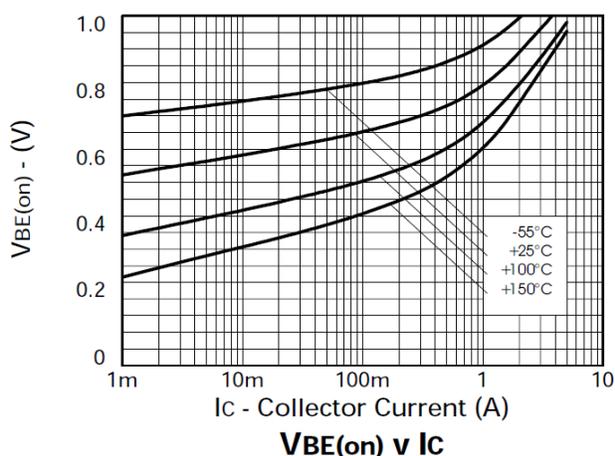
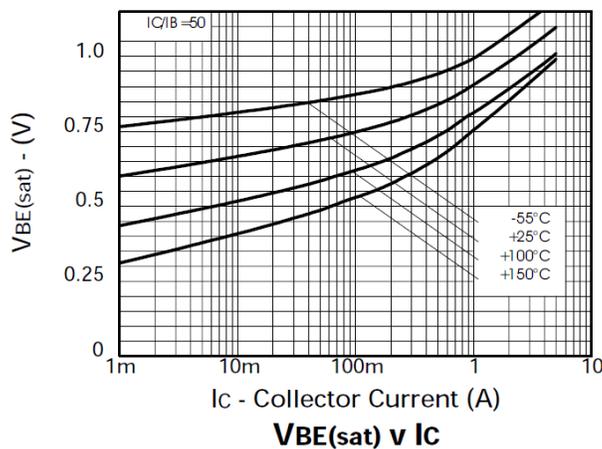
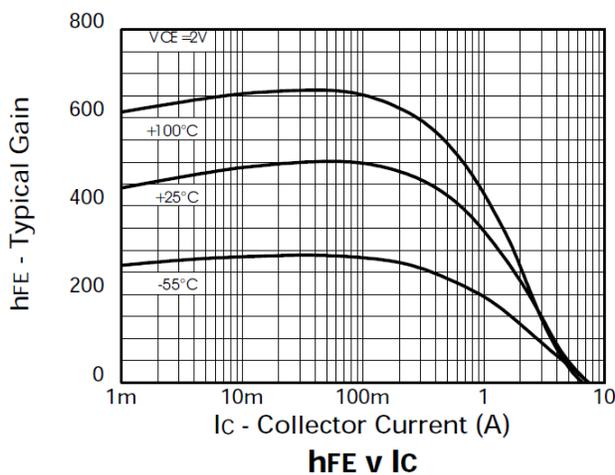
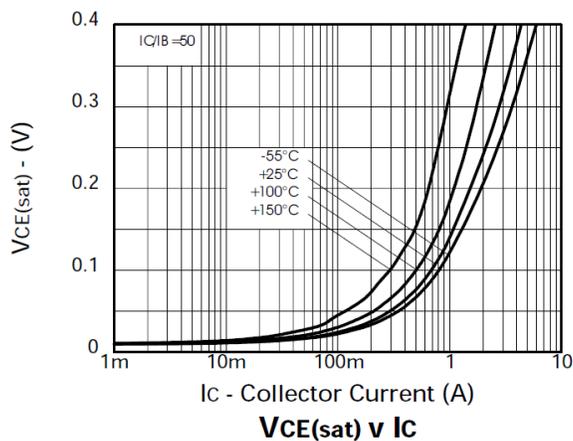
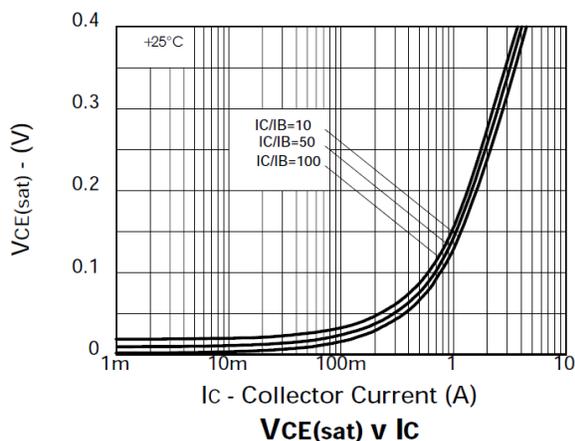
- Notes:
6. For a device mounted with the collector lead on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; the device is measured under still air conditions whilst operating in a steady-state. Two active dice running at equal power with heatsink split 50% to each collector.
  7. Same as Note 6, except the device is measured at t < 5 seconds.
  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.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	15	—	—	V	$I_C = 100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 10)	$BV_{CEO}$	15	—	—	V	$I_C = 10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	—	—	V	$I_E = 100\mu\text{A}, I_C = 0$
Collector Cut-Off Current	$I_{CBO}$	—	<-1	10	nA	$V_{CB} = 10\text{V}$
Emitter Cut-Off Current	$I_{EBO}$	—	<-1	10	nA	$V_{EB} = 5.6$
Emitter Cut-Off Current	$I_{CES}$	—	<-1	10	nA	$V_{CE} = 10\text{V}$
<b>ON CHARACTERISTICS (Note 10)</b>						
DC Current Gain	$h_{FE}$	200	420	—	—	$I_C = 10\text{mA}, V_{CE} = 2\text{V}$ $I_C = 100\text{mA}, V_{CE} = 2\text{V}$ $I_C = 500\text{mA}, V_{CE} = 2\text{V}$ $I_C = 1\text{A}, V_{CE} = 2\text{V}$ $I_C = 3\text{A}, V_{CE} = 2\text{V}$ $I_C = 5\text{A}, V_{CE} = 2\text{V}$
		300	450	—		
		250	390	—		
		200	300	—		
		75	150	—		
		30	75	—		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	16.5	20	mV	$I_C = 100\text{mA}, I_B = 10\text{mA}$
		—	40	55	mV	$I_C = 250\text{mA}, I_B = 10\text{mA}$
		—	75	100	mV	$I_C = 500\text{mA}, I_B = 10\text{mA}$
		—	150	200	mV	$I_C = 1\text{A}, I_B = 10\text{mA}$
		—	205	245	mV	$I_C = 1.5\text{A}, I_B = 20\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	0.93	1.10	V	$I_C = 1.5\text{A}, I_B = 20\text{mA}$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	0.865	1.10	V	$I_C = 1.5\text{A}, V_{CE} = 2\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{obo}$	—	15	—	pF	$V_{CB} = 10\text{V}, f = 1.0\text{MHz}$
Current Gain Bandwidth Product	$f_T$	—	180	—	MHz	$I_C = 50\text{mA}, V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Time	$t_{on}$	—	50	—	ns	$I_C = 1\text{A}, V_{CC} = 10\text{V}$
Turn-Off Time	$t_{off}$	—	250	—	ns	$I_{B1} = -I_{B2} = 100\text{mA}$

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

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

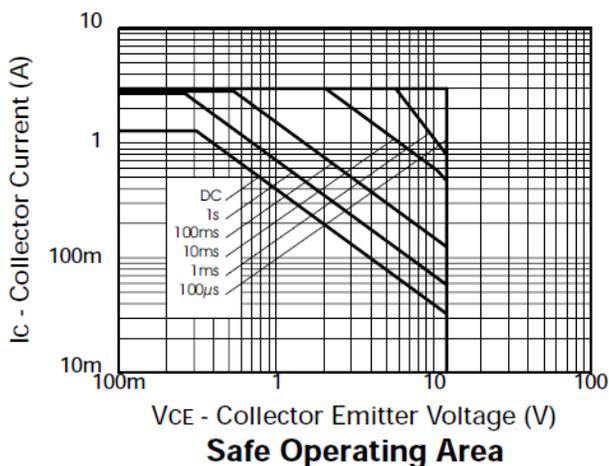
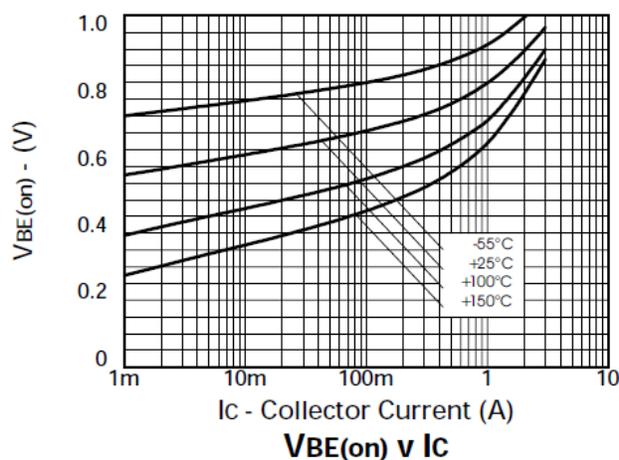
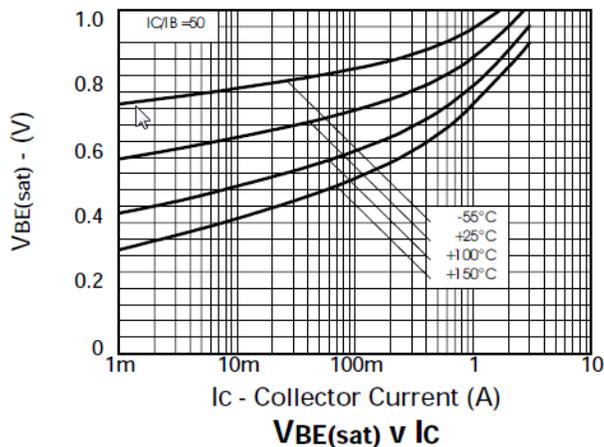
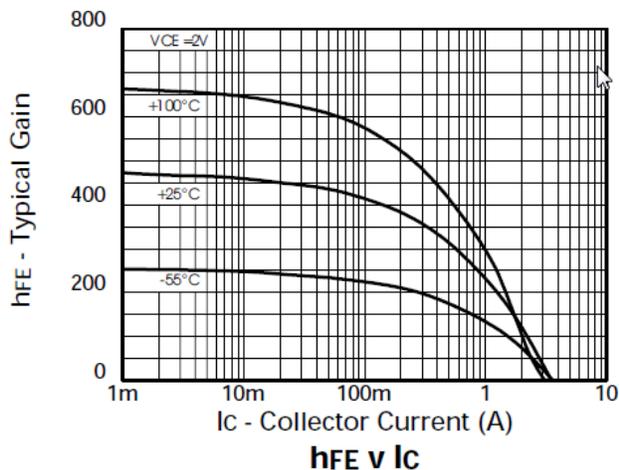
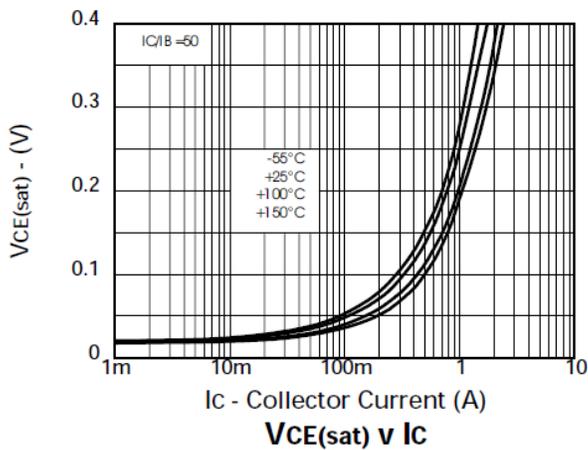
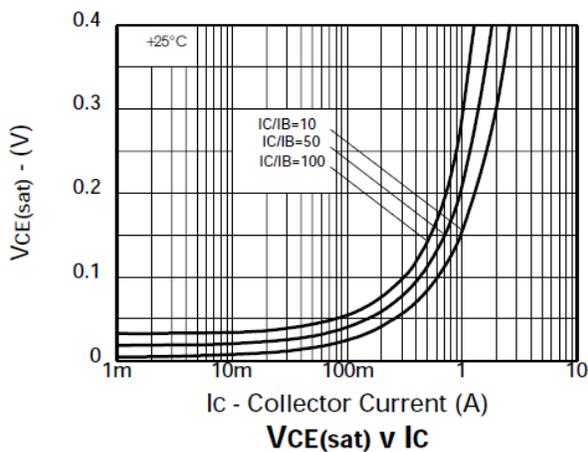


**PNP - Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

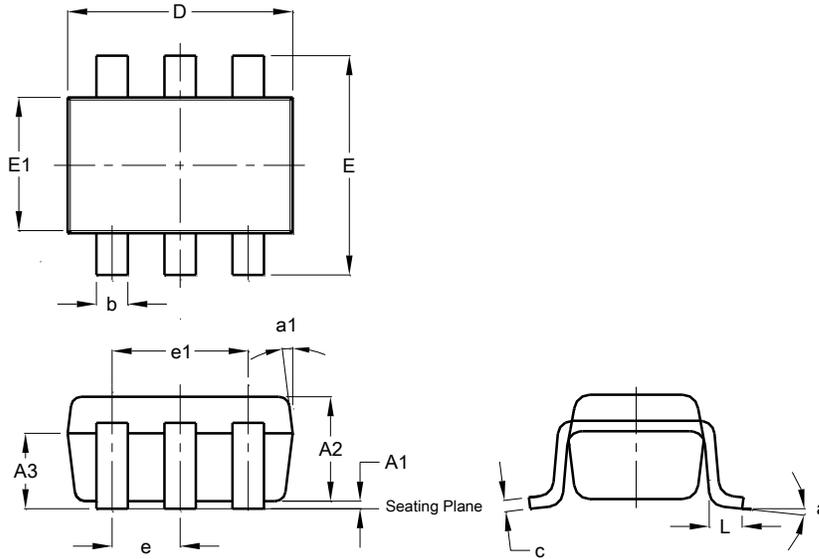
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	-12	—	—	V	$I_C = -100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 11)	$BV_{CEO}$	-12	—	—	V	$I_C = -10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	—	—	V	$I_E = -100\mu\text{A}, I_C = 0$
Collector Cut-Off Current	$I_{CBO}$	—	<-1	-10	nA	$V_{CB} = -10\text{V}$
Emitter Cut-Off Current	$I_{EBO}$	—	<-1	-10	nA	$V_{EB} = -5.6\text{V}$
Emitter Cut-Off Current	$I_{CES}$	—	<-1	-10	nA	$V_{CE} = -10\text{V}$
<b>ON CHARACTERISTICS (Note 11)</b>						
DC Current Gain	$h_{FE}$	300	490	—	—	$I_C = -10\text{mA}, V_{CE} = -2\text{V}$
		300	450	—		
		200	340	—		
		125	250	—		
		75	140	—		
30	80	—	$I_C = -3\text{A}, V_{CE} = -2\text{V}$			
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	-25	-40	mV	$I_C = -100\text{mA}, I_B = -10\text{mA}$
		—	-55	-100	mV	$I_C = -250\text{mA}, I_B = -10\text{mA}$
		—	-110	-175	mV	$I_C = -500\text{mA}, I_B = -10\text{mA}$
		—	-160	-215	mV	$I_C = -1\text{A}, I_B = -50\text{mA}$
		—	-185	-240	mV	$I_C = -1.25\text{A}, I_B = -100\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	-0.99	-1.10	V	$I_C = -1.25\text{A}, I_B = -100\text{mA}$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	-0.85	-1.0	V	$I_C = -1.25\text{A}, V_{CE} = -2\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{obo}$	—	15	—	pF	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}$
Current Gain Bandwidth Product	$f_T$	—	220	—	MHz	$I_C = -50\text{mA}, V_{CE} = -10\text{V}$ $f = 100\text{MHz}$
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Time	$t_{on}$	—	50	—	ns	$I_C = -1\text{A}, V_{CC} = -10\text{V}$
Turn-Off Time	$t_{off}$	—	135	—	ns	$I_{B1} = -I_{B2} = -100\text{mA}$

 Note: 11. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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

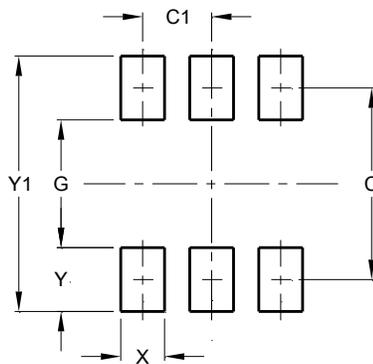


### Package Outline Dimensions



SOT26			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

### Suggested Pad Layout



Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20