

Over-Voltage-Protection IC with 80V TVS in FCQFN-9 and SOT23-6

DESCRIPTION

ETA6123 is an Over-Voltage-Protection (OVP) IC with an ultra-low 40mΩ RDSON high current high voltage MOSEFT and an integrated TVS device to improve surge protection. It can wok with a DC input voltage as high as 24.5V DC, above which, the integrated TVS will start to function by clamping any higher voltage to around 30V (given 80V 8/20us surge test condition).

When input voltage of ETA6123 exceed the OVP threshold, it responses quickly and shuts off the MOSFET. The OVP threshold is fixed internally. There is also an over-current-protection feature for the switch. When overload condition occurs, it goes into a hiccup mode to protect the IC from over-heating. It also has an over-temperature protection feature that turns off the MOSFET.

ETA6123 is available in FCQFN1.2x1.2-9L and SOT23-6 package.

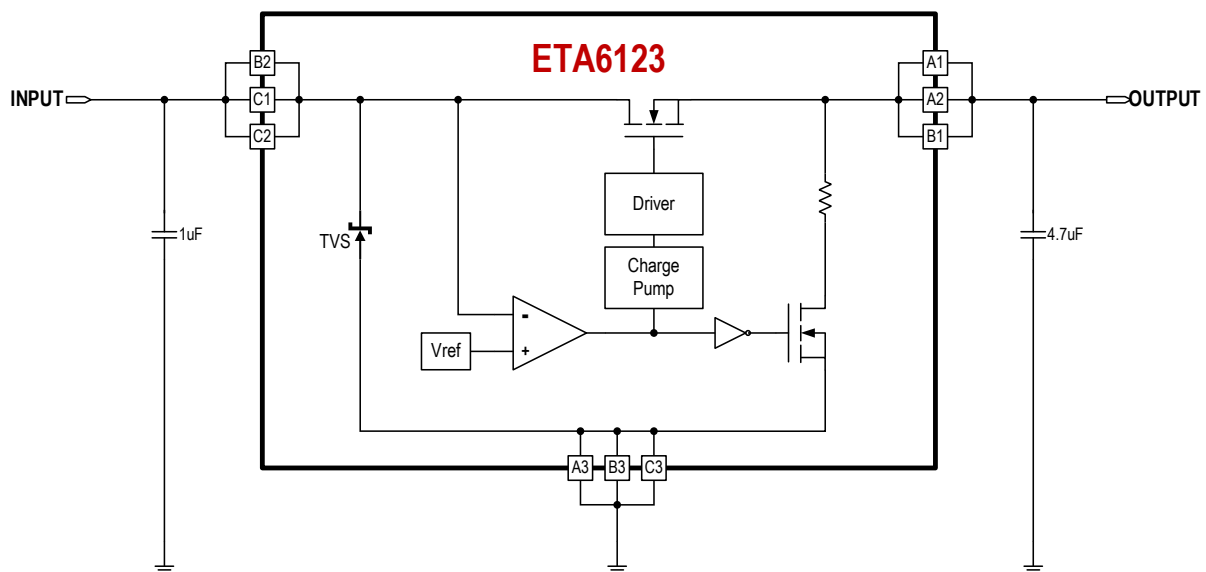
FEATURES

- ◆ Over voltage protection up to 24.5V
- ◆ 40mΩ switch resistance
- ◆ 60nS fast transient response
- ◆ Internally set current limit and VOUT short protection
- ◆ Integrated 80V TVS
- ◆ FCQFN-9 package, compatible to WLCSP-9 with better reliability, SOT23-6 package also available

APPLICATIONS

- ◆ Smart Phone
- ◆ Tablet, MID
- ◆ Car camera

TYPICAL APPLICATION



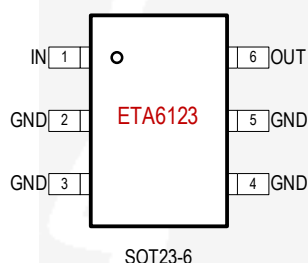
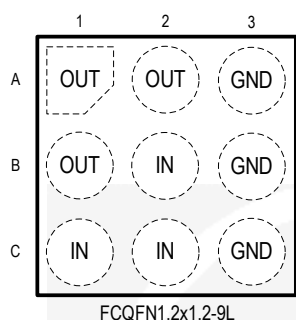
*Pin number is for FCQFN1.2x1.2-9 package

ORDERING

INFORMATION

| PART No. | PACKAGE | TOP MARK | Pcs/Reel |
|-----------------|-----------------|----------|----------|
| ETA6123FQAJ | FCQFN1.2x1.2-9L | IBYW | 3000 |
| ETA6123S2G | SOT23-6 | IBYW | 3000 |
| ETA6123V620FQAJ | FCQFN1.2x1.2-9L | ILYW | 3000 |
| ETA6123V620S2G | SOT23-6 | ILYW | 3000 |
| ETA6123V680FQAJ | FCQFN1.2x1.2-9L | IVYW | 3000 |
| ETA6123V680S2G | SOT23-6 | IVYW | 3000 |
| ETA6123V105FQAJ | FCQFN1.2x1.2-9L | I6YW | 3000 |
| ETA6123V105S2G | SOT23-6 | I6YW | 3000 |
| ETA6123V140FQAJ | FCQFN1.2x1.2-9L | IiYW | 3000 |
| ETA6123V140S2G | SOT23-6 | IiYW | 3000 |

PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

(Note: Exceeding these limits may damage the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

| | |
|--|-----------------------|
| IN Voltage | -0.3V to 26V |
| OUT Voltage | -0.3V to IN+0.3V |
| Operating Temperature Range..... | -40°C to 85°C |
| Storage Temperature Range | -55°C to 150°C |
| Thermal Resistance θ_{JA} θ_{JC} | |
| FCQFN1.2x1.2-9..... | 120.....40..... °C/W |
| SOT23-6..... | 190.....110..... °C/W |
| Lead Temperature (Soldering, 10sec) | 260°C |
| ESD HBM | 8KV |
| Latchup | 200mA |

ELECTRICAL CHARACTERISTICS

(IN= 5V, unless otherwise specified. Typical values are at $T_A = 25^\circ\text{C}$.)

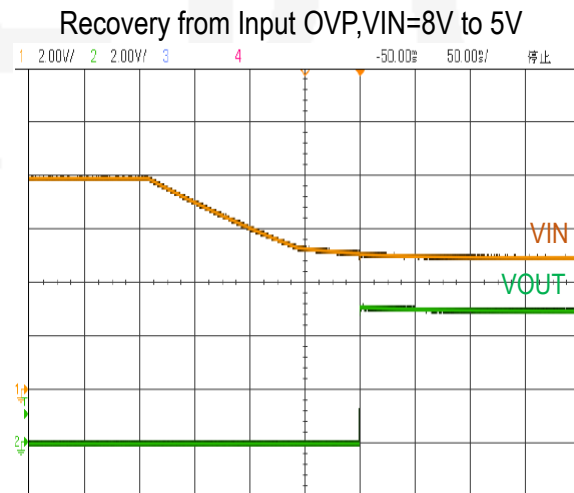
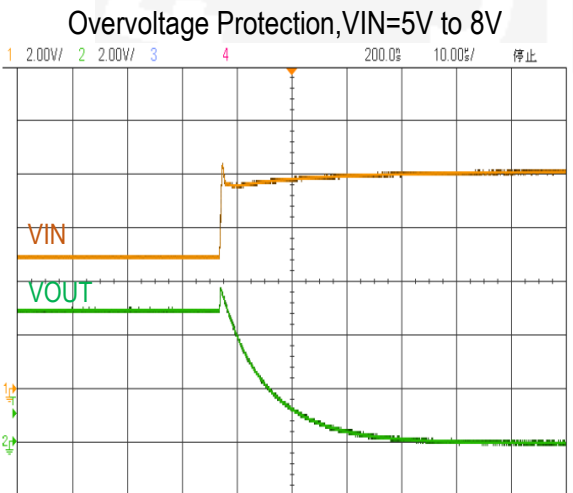
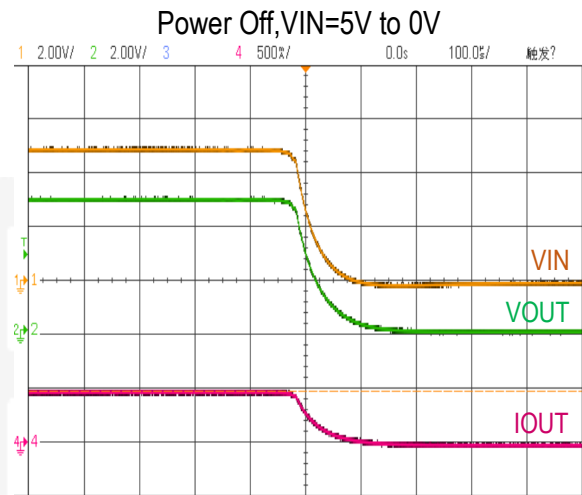
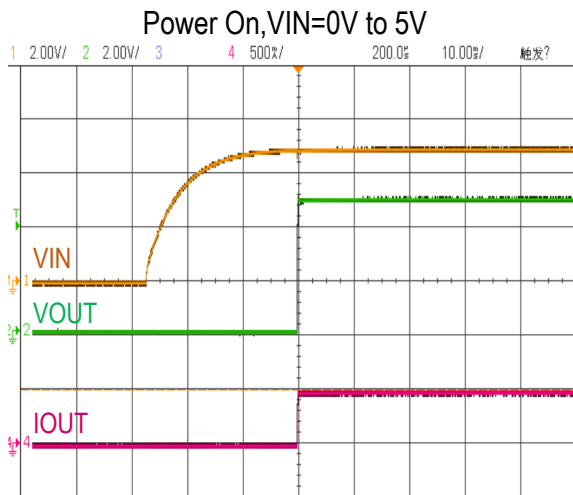
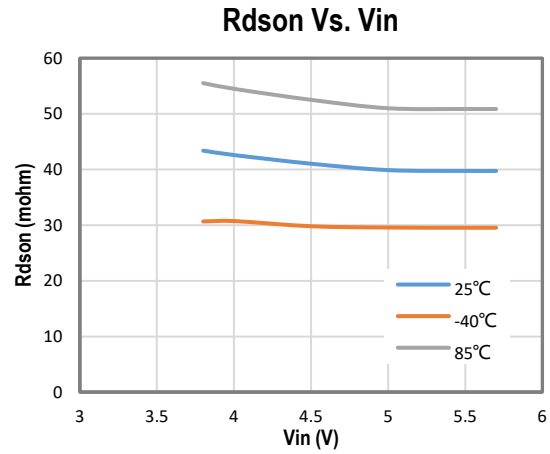
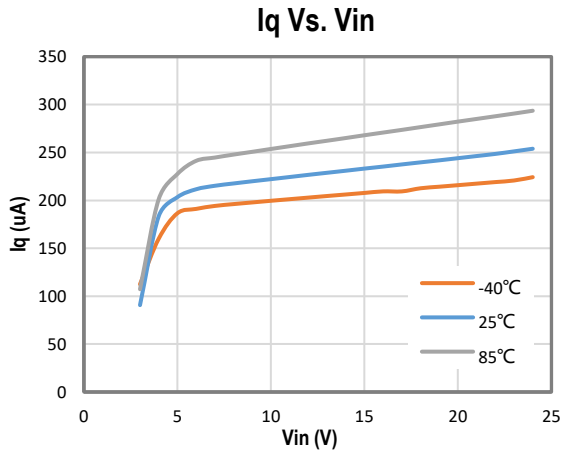
| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|-------------------------|---------------------------------------|-----|------|------|---------------|
| INPUT Operation | | | | | |
| INPUT Range | | 4.1 | | 24.5 | V |
| INPUT CLAMP | $I_{IN}=10\text{mA}$ | | 26 | | V |
| INPUT UVLO | Rising, Hys=280mV | | 3.85 | | V |
| INPUT Quiescent Current | $V_{IN}=5\text{V}$ V_{OUT} floating | | 160 | | μA |
| OVP | | | | | |

| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|--------------------------------|---|-------|-------|-------|-------------|
| OVP | Over voltage trip level, Rising, ETA6123 | 5.68 | 5.85 | 6.02 | V |
| | Over voltage trip level, Rising, ETA6123V620 | 6.02 | 6.2 | 6.38 | V |
| | Over voltage trip level, Rising, ETA6123V680 | 6.6 | 6.8 | 7 | V |
| | Over voltage trip level, Rising, ETA6123V105 | 10.19 | 10.5 | 10.81 | V |
| | Over voltage trip level, Rising, ETA6123V140 | 13.58 | 14 | 14.42 | V |
| OVP HYS | Over voltage trip level, hysteresis, ETA6123 | | 0.556 | | V |
| | Over voltage trip level, hysteresis, ETA6123V620 | | 0.591 | | V |
| | Over voltage trip level, hysteresis, ETA6123V680 | | 0.647 | | V |
| | Over voltage trip level, hysteresis, ETA6123V105 | | 1.00 | | V |
| | Over voltage trip level, hysteresis, ETA6123V140 | | 1.33 | | V |
| RDSON | Switch On Resistance. $V_{IN}=5V$, $I_{OUT}=1A$, $25^{\circ}C$ | | 40 | | m Ω |
| Current limit | Switch current limit | | 5 | | A |
| Rdis | VO _{UT} discharge resistance | | 230 | | Ω |
| Thermal shutdown | $V_{IN}=5V$ VO _{UT} floating | | 130 | | $^{\circ}C$ |
| Thermal shutdown hysteresis | $V_{IN}=5V$ VO _{UT} floating | | 20 | | $^{\circ}C$ |
| Dynamic Characteristics | | | | | |
| T _{power-on} | Power ON delay $V_{IN} > UVLO$ to 90% VO _{UT} | | 18 | | mS |
| T _{ovp} | Over-voltage response time. $V_{IN} > V_{OVPTO}$ VO _{UT} stop rising | | 60 | | nS |

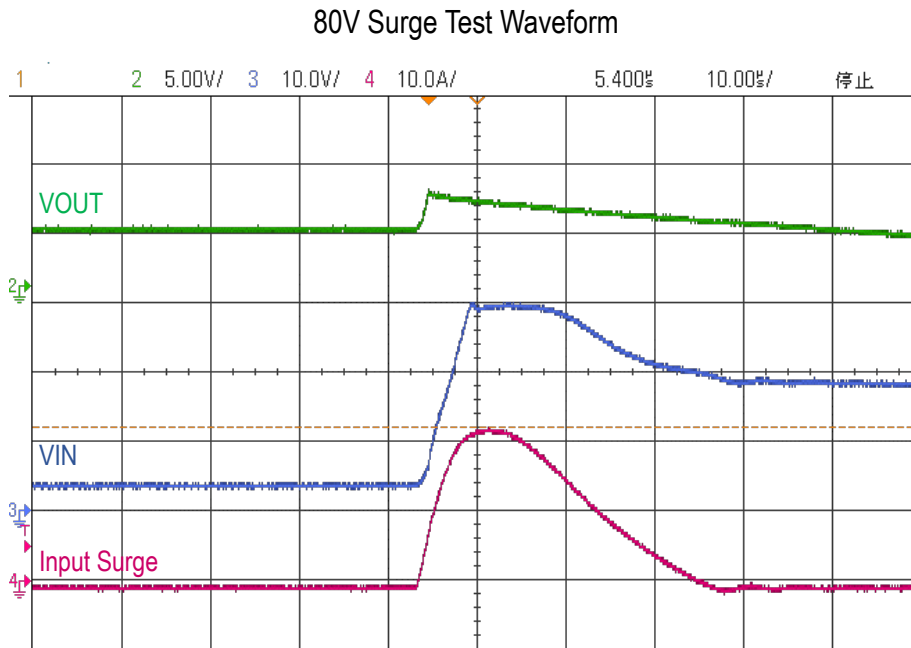
PIN DESCRIPTION

| FCQFN-9 PIN # | SOT23-6 PIN # | NAME | DESCRIPTION |
|---------------|---------------|------|--|
| B2, C1, C2 | 1 | IN | Input Pin. Bypass with a 1 μ F capacitor to GND. |
| A1, A2, B1 | 6 | OUT | Output Power Pin. Bypass with a 4.7 μ F capacitor to GND |
| A3, B3, C3 | 2, 3, 4, 5 | GND | Ground Pin. |

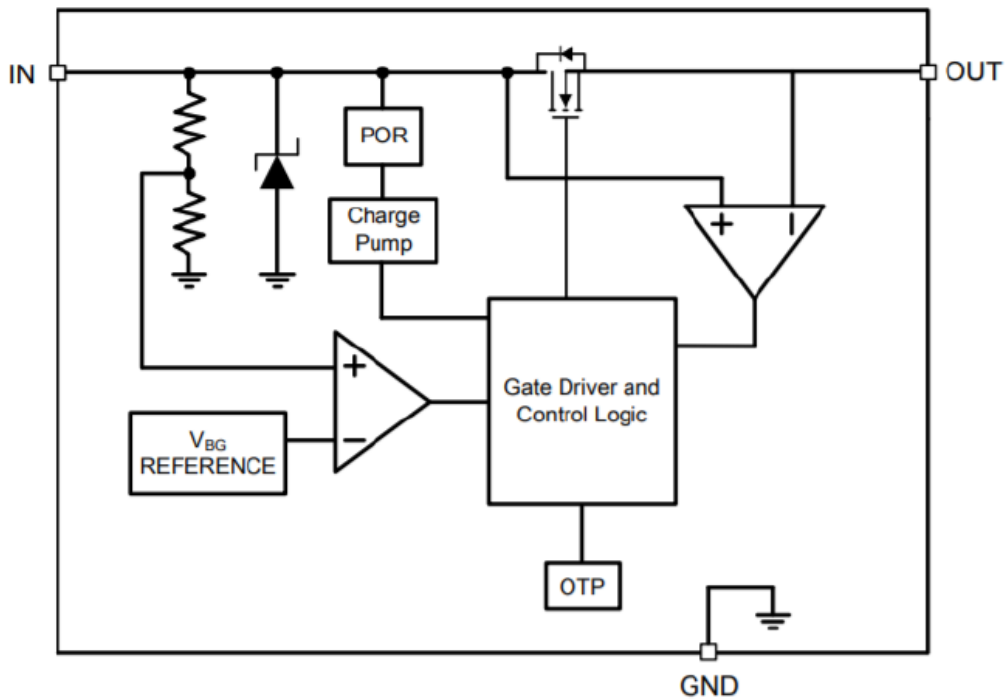
TYPICAL OPERATION CHARACTERISTICS



TYPICAL OPERATION CHARACTERISTICS Cont'd

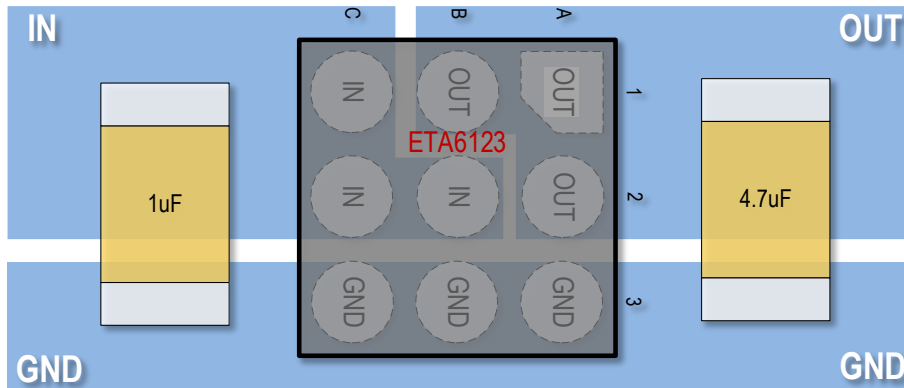


BLOCK DIAGRAM

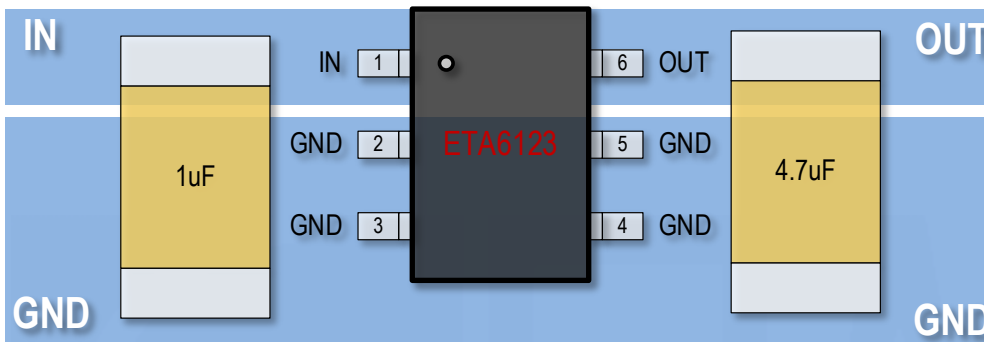


PCB GUIDELINE

PCB Example for FCQFN1.2x1.2-9 package

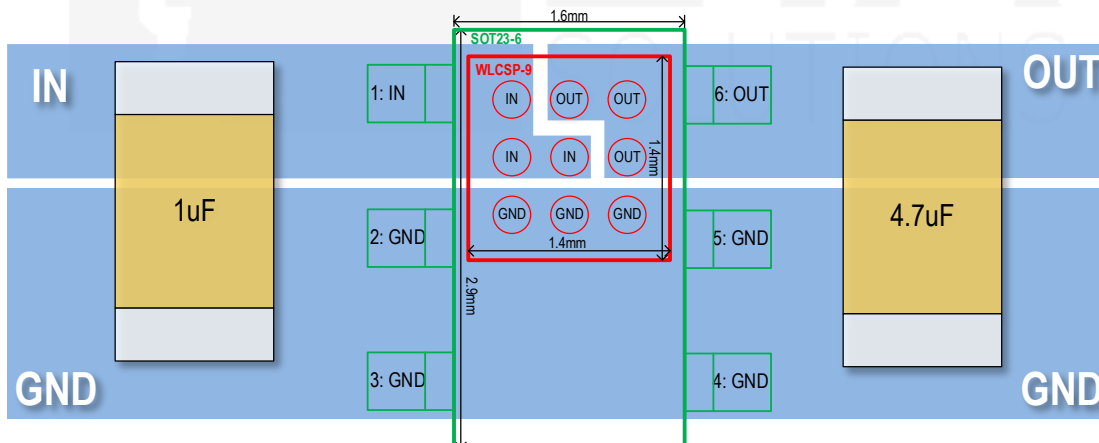


PCB Example for SOT23-6 package



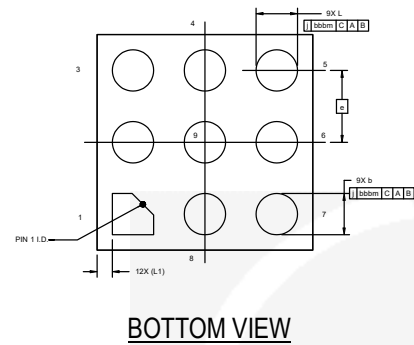
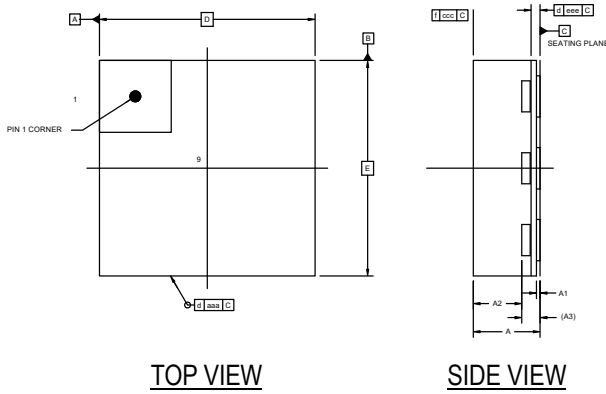
PCB Example for compatible layout of SOT23-6 package to a WLCSP-9 package

As WLCSP-9's chip size is small and can be fully covered by SOT23-6's body, the WLCSP can be laid just beneath SOT23-6 for a compatible PCB design. An example is shown below that both chips can share the same input and output capacitors at same places. Then the PCB can be mounted with either WLCSP-9 package, FCQFN-9 package or a SOT23-6 package without occupying any additional PCB area.



PACKAGE OUTLINE

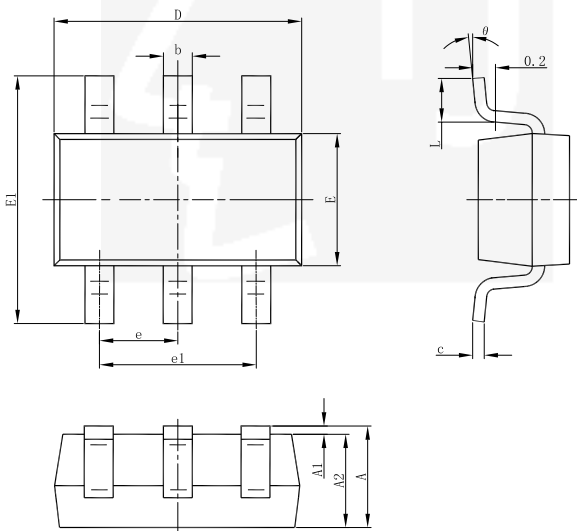
Package: FCQFN 1.2x1.2-9



Dimension in Millimeters

| | SYMBOL | MIN | NOM | MAX |
|---------------------------|--------|-----------|------|------|
| TOTAL THICKNESS | A | 0.32 | 0.37 | 0.4 |
| STAND OFF | A1 | 0 | 0.02 | 0.05 |
| MOLD THICKNESS | A2 | --- | 0.27 | --- |
| L/F THICKNESS | A3 | 0.102 REF | | |
| LEAD WIDTH | b | 0.18 | 0.23 | 0.28 |
| BODY SIZE | X | D 1.2 BSC | | |
| | Y | E 1.2 BSC | | |
| LEAD PITCH | e | 0.4 BSC | | |
| LEAD LENGTH | L | 0.18 | 0.23 | 0.28 |
| LEAD EDGE TO PACKAGE EDGE | L1 | 0.085 REF | | |
| PACKAGE EDGE TOLERANCE | aaa | 0.1 | | |
| MOLD FLATNESS | ccc | 0.1 | | |
| COPLANARITY | eee | 0.05 | | |
| LEAD OFFSET | bbb | 0.07 | | |

Package: SOT23-6



| Symbol | Dimensions in Millimeters | | Dimensions in Inches | |
|--------|---------------------------|------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.05 | 1.25 | 0.041 | 0.049 |
| A1 | 0 | 0.1 | 0 | 0.004 |
| A2 | 1.05 | 1.15 | 0.041 | 0.045 |
| b | 0.3 | 0.5 | 0.012 | 0.02 |
| c | 0.1 | 0.2 | 0.004 | 0.008 |
| D | 2.82 | 3.02 | 0.111 | 0.119 |
| E | 1.5 | 1.7 | 0.059 | 0.067 |
| E1 | 2.65 | 2.95 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.8 | 2 | 0.071 | 0.079 |
| L | 0.3 | 0.6 | 0.012 | 0.024 |
| theta | 0° | 8° | 0° | 8° |