G674/G675

Microprocessor Reset IC

Features

- **Precision Monitoring of +2.5V and +3V Power-Supply Voltages**
- **Fully Specified Over Temperature**
- **Available in Three Output Configurations**
  Push-Pull $\overline{\text{RESET}}$ Output (G674L)
  Push-Pull RESET Output (G674H)
  Open-Drain $\overline{\text{RESET}}$ Output (G675L)
- **Externally Programmable Time Delay Generator**
- **14µA Supply Current**
- **Guaranteed Reset Valid to V_{CC} = 0.8V**
- **Power Supply Transient Immunity**
- **5 pin SOT-23-5 and 6 pin TDFN2X2 Packages**
- **2% Threshold Accuracy**

Applications

- **Computers**
- **Controllers**
- **Intelligent Instruments**
- **Critical µP and µC Power Monitoring**
- **Portable / Battery-Powered Equipment**
- **Automotive**

General Description

The G674/G675 are microprocessor (µP) supervisory circuits used to monitor the power supplies in µP and digital systems. They provide excellent circuit reliability and low cost and adjustments when used with +2.5V, +3.0V powered circuits.

These circuits perform a single function: they assert a reset signal whenever the V_{CC} supply voltage declines below a preset threshold, with hysteresis keeping it asserted for time delay determined by externally programmable time delay generator after V_{CC} has risen above the reset threshold. Reset thresholds suitable for operation with a variety of supply voltages are available.

The G675L has an open-drain output stage, while the G674 have push-pull outputs. The G675L's open-drain $\overline{\text{RESET}}$ output requires a pull-up resistor that can be connected to a voltage higher than V_{CC}. The G674L have an active-low $\overline{\text{RESET}}$ output, while the G674H has an active-high RESET output. The reset comparator is designed to ignore fast transients on V_{CC}, and the outputs are guaranteed to be in the correct logic state for V_{CC} down to 0.8V.

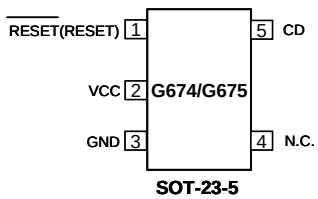
Low supply current makes the G674/G675 ideal for use in portable equipment. The G674/G675 are available in 5-pin SOT-23-5 and 6 pin TDFN2X2 packages.

Ordering Information

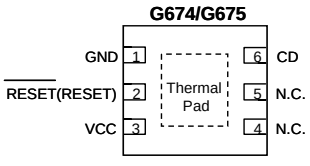
ORDER NUMBER	TEMP. RANGE	PACKAGE (Green)
G674HxxxT1U	-40°C ~ +105°C	SOT-23-5
G674LxxxT1U	-40°C ~ +105°C	SOT-23-5
G675LxxxT1U	-40°C ~ +105°C	SOT-23-5
G674HxxxRB1U	-40°C ~ +105°C	TDFN2X2-6
G674LxxxRB1U	-40°C ~ +105°C	TDFN2X2-6
G675LxxxRB1U	-40°C ~ +105°C	TDFN2X2-6

* xxx specifies the threshold voltage.
e.g. 240 denotes the 2.4V threshold voltage.

Pin Configuration



SOT-23-5

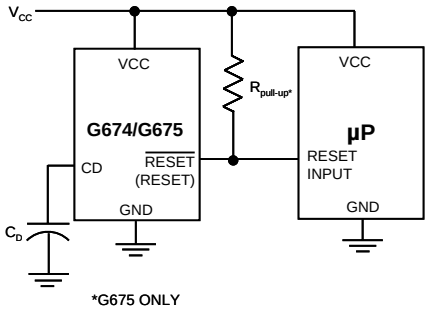


TDFN2X2-6

Note: Recommend connecting the Thermal Pad to the Ground for excellent power dissipation.

()is for G674H

Typical Application Circuit



*G675 ONLY

ICC may increased at high T_A, Therefore, can not connect Resistors to VCC to prevent Icc abnormal behavior at high T_A.

Selector Guide

ORDER NUMBER	RESET THRESHOLD (V)	OUTPUT TYPE	MARKING
G675L240T1U	2.4	Open-Drain $\overline{\text{RESET}}$	675Hx
G675L220T1U	2.2	Open-Drain $\overline{\text{RESET}}$	675Ix
G675L200T1U	2.0	Open-Drain $\overline{\text{RESET}}$	675Jx
G674H240T1U	2.4	Push-Pull RESET	674Px
G674H220T1U	2.2	Push-Pull RESET	674Rx
G674H200T1U	2.0	Push-Pull RESET	674Tx
G674L240T1U	2.4	Push-Pull $\overline{\text{RESET}}$	674Ox
G674L220T1U	2.2	Push-Pull $\overline{\text{RESET}}$	674Qx
G674L200T1U	2.0	Push-Pull $\overline{\text{RESET}}$	674Sx
G675L240RB1U	2.4	Open-Drain $\overline{\text{RESET}}$	675H
G675L220RB1U	2.2	Open-Drain $\overline{\text{RESET}}$	675I
G675L200RB1U	2.0	Open-Drain $\overline{\text{RESET}}$	675J
G674H240RB1U	2.4	Push-Pull RESET	674P
G674H220RB1U	2.2	Push-Pull RESET	674R
G674H200RB1U	2.0	Push-Pull RESET	674T
G674L240RB1U	2.4	Push-Pull $\overline{\text{RESET}}$	674O
G674L220RB1U	2.2	Push-Pull $\overline{\text{RESET}}$	674Q
G674L200RB1U	2.0	Push-Pull $\overline{\text{RESET}}$	674S

Note: T1: SOT-23-5 RB: TDFN2X2-6
1: Bonding Code (only for TDFN2X2-6)
U : Tape & Reel

Absolute Maximum Ratings

Terminal Voltage (with respect to GND)
V_{CC}. . . . . .-0.3V to +6.0V
Delay Capacitor Pin Voltage, V_{CD}. . -0.3 to (V_{CC} +0.3V)
RESET, $\overline{RESET}$ (push-pull) . . . . .-0.3V to (V_{CC} + 0.3V)
$\overline{RESET}$ (open drain) . . . . . .-0.3V to +6.0V
Input Current, V_{CC}. 20mA
Thermal Resistance Junction to Ambient, (θ_{JA})*
SOT-23-5. . . . . .250°C/W
TDFN2X2-6 . . . . . 200°C/W

Continuous Power Dissipation (T_A = +25°C)*
SOT-23-5 . . . . . .0.4W
TDFN2X2-6 . . . . . 0.5W
Output Current, RESET, $\overline{RESET}$ 20mA
Operating Temperature Range. . . . . -40°C to +105°C
Storage Temperature Range. . . . . .-65°C to +150°C
Reflow Temperature (soldering, 10sec) . . . .260°C

*Please Refer to “Minimum Footprint PCB Layout Section”.

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

V_{CC} = full range, T_A = -40°C to +105°C, unless otherwise noted. Typical values are at T_A = +25°C. (Note 1)

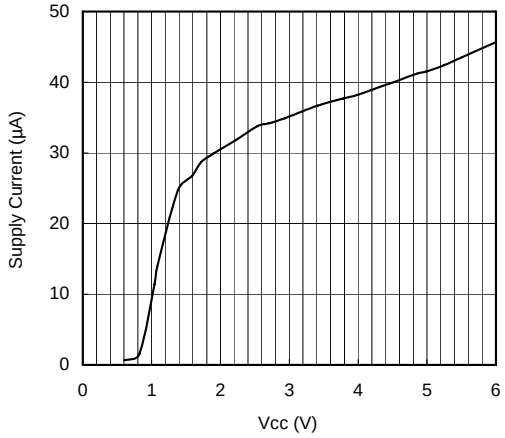
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
V_{CC} Range		T_A = 0°C +70°C	0.8	---	5.5	V
		T_A = -40°C +105°C	1	---	5.5	
Supply Current (SOT-23-5)	I_{CC}	V_{CC}<3.3V, G67_ _240/220_	---	35	50	µA
		V_{CC}<2.75V, G67_ _200_	---	32	45	
Reset Threshold	V_{TH-}	G67_ _240_	2.38	2.43	2.48	V
		G67_ _220_	2.195	2.245	2.295	
		G67_ _200_	1.95	2.	2.05	
Reset Threshold Hysterisis	V_{HYS}		3.6	5.3	7	%
Reset Threshold Tempco			---	70	---	ppm/°C
C_D Delay Pin Threshold Voltage	V_{TDC}		0.35	0.5	0.7	V
Delay Capacitor Pin Sink Current	I_{CD}	V_{CC} = 1.5V, V_{CD} = 0.5V	3	5	---	mA
Delay Capacitor Pin Source Current		V_{CC} > V_{TH-} + V_{HYS}	0.05	0.09	0.18	µA
$\overline{RESET}$ Output Current Low (push-pull active low, and open-drain active-low, G674L and G675L)	I_{OL}	V_{CC} = 1.8V, $V_{\overline{RESET}}$ = 0.5V	5	---	---	mA
$\overline{RESET}$ Output Current High (push-pull active low, G674L)	I_{OH}	V_{CC} = 3V, $V_{\overline{RESET}}$ = 2.5V, G674L240/220	3	---	---	mA
		V_{CC} = 2.5V, $V_{\overline{RESET}}$ = 2V, G674L200	2	---	---	
RESET Output Current Low (push-pull active high, G674H)	I_{OL}	V_{CC} = 3V, V_{RESET} = 0.5V, G674H240/220	12	---	---	mA
		V_{CC} = 2.5V, V_{RESET} = 0.5V, G674H200	10	---	---	
RESET Output Current High (push-pull active high, G674H)	I_{OH}	V_{CC} =1.8V, V_{RESET} = 1.3V	2	---	---	mA
$\overline{RESET}$ Open-Drain Output Leakage Current (G675L)		V_{CC} > V_{TH}, $\overline{RESET}$ deasserted	---	---	1	µA

Note 1: Production testing done at T_A = +25°C; limits over temperature guaranteed by design.

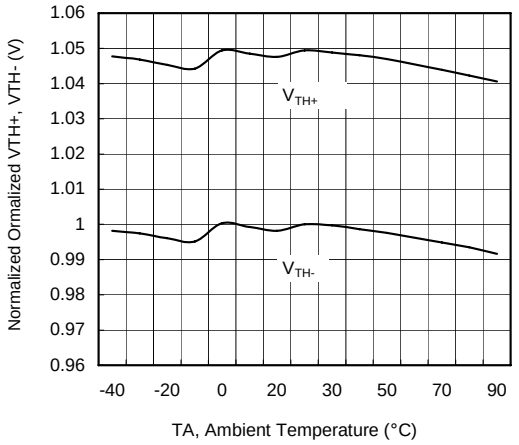
Electrical Characteristics

V_{CC} = full range, T_A = -40°C to +105°C, unless otherwise noted. Typical values are at T_A = +25°C.

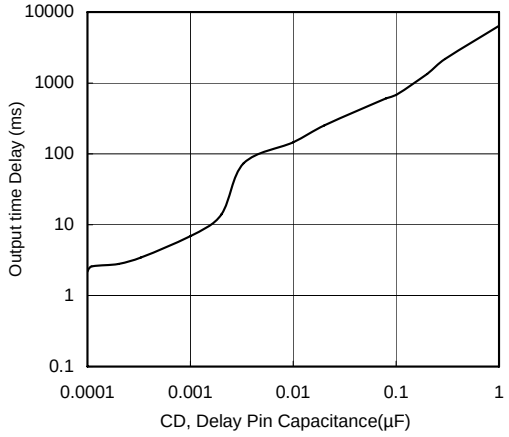
Supply Current vs. Vcc



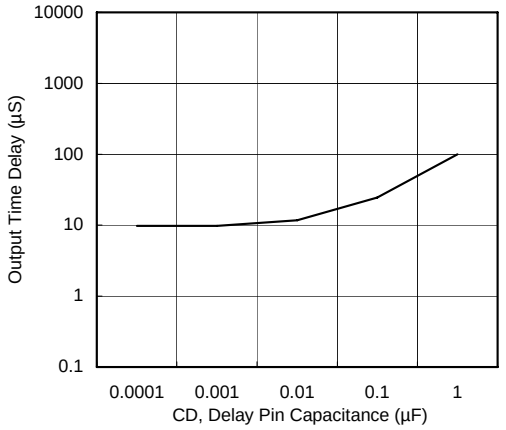
Normalized Reset Threshold vs. Temperature



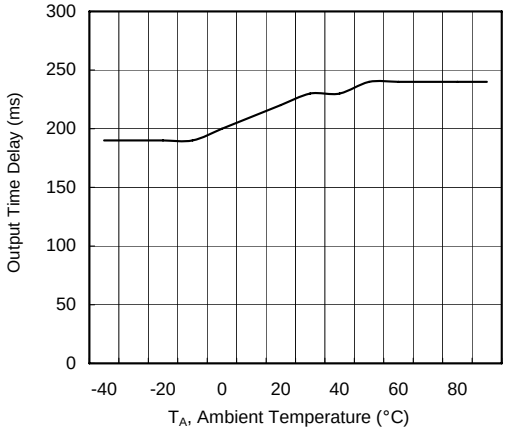
Output Time Delay vs Capacitance
(Vcc>V_{TH} to output change)



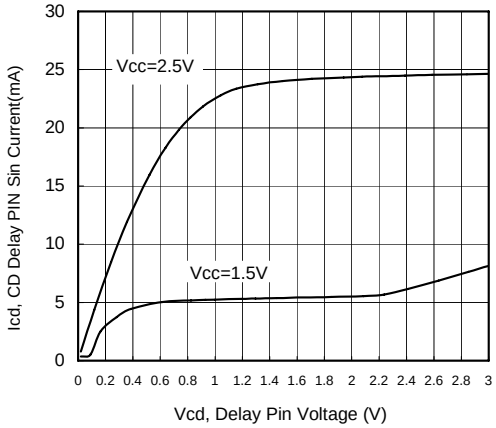
Output Time Delay vs. Capacitance
(V_{CC}<V_{TH} to output change)



Reset Output Time Delay vs. Temperature

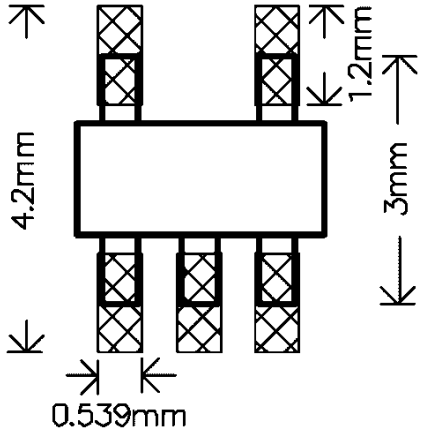


CD Delay Pin Sink Current vs. Voltage

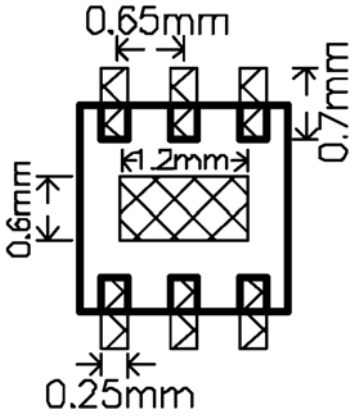


Minimum Footprint PCB Layout Section

SOT-23-5



TDFN2X2-6



Timing Diagram

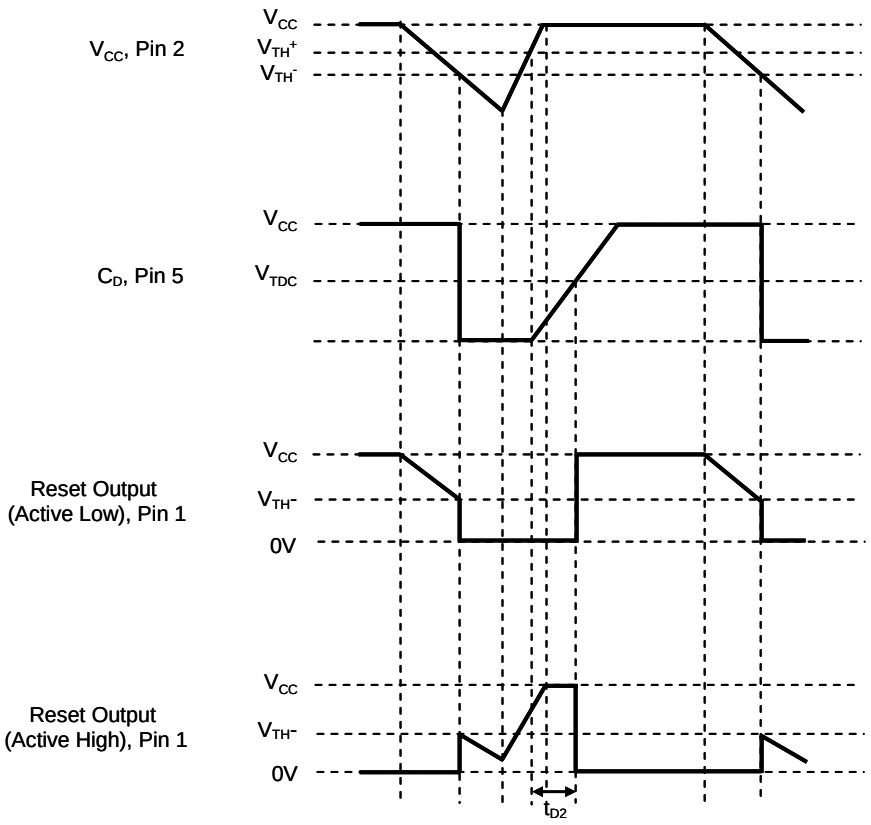


Figure 1

Functional Diagram

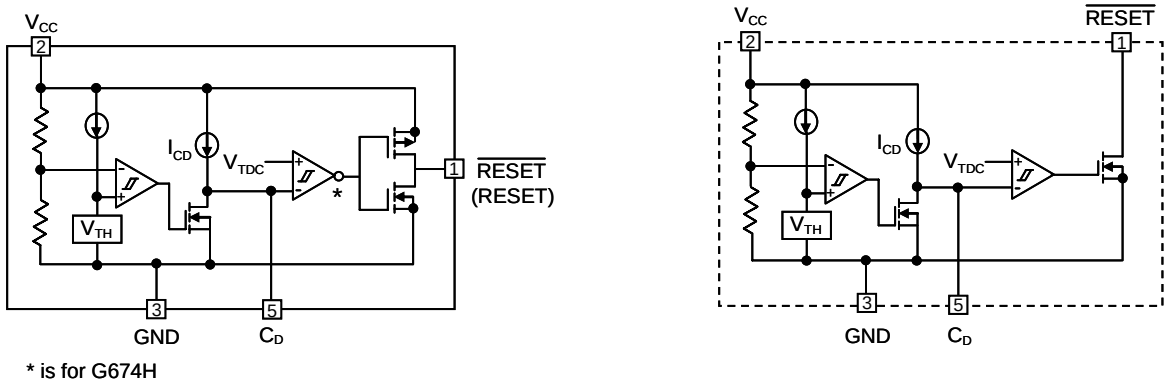


Figure 2

Pin Description

PIN		NAME	FUNCTION
SOT-23-5	TDFN2X2-6		
1	2	$\overline{\text{RESET}}$ (G674L/G675L)	$\overline{\text{RESET}}$ Output remains low while V_{CC} is below the reset threshold, and for delay time set by C_D after V_{CC} rises above the reset threshold.
		RESET (G674H)	RESET Output remains high while V_{CC} is below the reset threshold, and for delay time set by C_D after V_{CC} rises above the reset threshold.
2	3	V_{CC}	Supply Voltage (+5V, +3.3V, +3.0V)
3	1	GND	Ground
4	4, 5	N.C.	No Connection.
5	6	C_D	External Programmable time delay is set by the capacitor connect to C_D pin.

Detailed Description

A microprocessor's (µP's) reset input starts the µP in a known state. The G675L/G674L/G674H assert reset to prevent code-execution errors during power-up, power-down, or brownout conditions. They assert a reset signal whenever the V_{CC} supply voltage declines below a preset threshold (V_{TH-}), keeping it asserted for time delay set by capacitor connected to C_D pin, after V_{CC} has risen above the high reset threshold V_{TH+} ($V_{TH-}+V_{HYS}$). The G675L uses an open-drain output, and the G674L/G675H have a push-pull output stage. Connect a pull-up resistor on the G675's $\overline{\text{RESET}}$ output to any supply between 0 and 5.5V.

The time delay is set by external capacitor C_D, and internal pull up current I_{CD}. When the voltage at C_D pin exceeds the buffer threshold, typically 1.25V, the $\overline{\text{RESET}}$ output high (RESET output low). The voltage detector and buffer have built-in hysterisis to prevent erratic reset operation. The formula of time delay is T (ms) ≅ 6740 C_D (µF). Fig1 and Fig 2 show a timing deagram and a Functional Block.

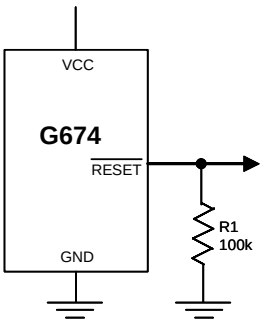


Figure3. $\overline{\text{RESET}}$ Valid to V_{CC} = Ground Circuit

Ensuring a Valid Reset Output Down to V_{CC} = 0

When V_{CC} falls below 0.8V, the G674 $\overline{\text{RESET}}$ output no longer sinks current—it becomes an open circuit. Therefore, high-impedance CMOS logic inputs connected to $\overline{\text{RESET}}$ can drift to undetermined voltages. This presents no problem in most applications since most µP and other circuitry is inoperative with VCC below 0.8V. However, in applications where $\overline{\text{RESET}}$ must be valid down to 0V, adding a pull-down resistor to $\overline{\text{RESET}}$ causes any stray leakage currents to flow to ground, holding $\overline{\text{RESET}}$ low (Figure 4). R1's value is not critical; 100kΩ is large enough not to load $\overline{\text{RESET}}$ and small enough to pull $\overline{\text{RESET}}$ to ground.

A 100kΩ pull-up resistor to V_{CC} is also recommended for the G675L if $\overline{\text{RESET}}$ is required to remain valid for V_{CC} < 0.8V.

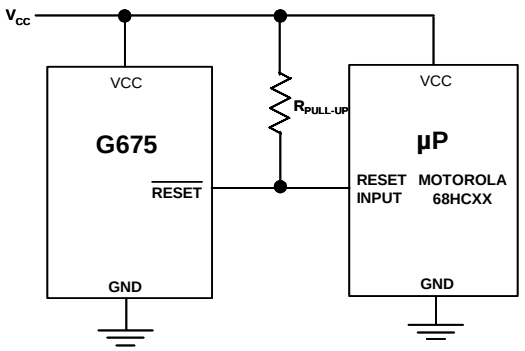


Figure 4. Interfacing to µPs with Bidirectional Reset I/O

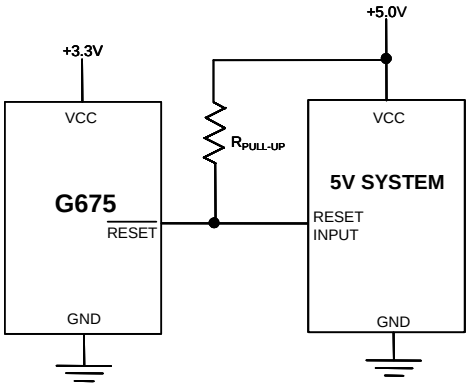


Figure 5. G675L Open-Drain $\overline{\text{RESET}}$ Output Allows Use with Multiple Supplies

Interfacing to µPs with Bidirectional Reset Pins

Since the $\overline{\text{RESET}}$ output on the G675L is open drain, this device interfaces easily with µPs that have bidirectional reset pins, such as the Motorola 68HC11. Connecting the µP supervisor's $\overline{\text{RESET}}$ output directly to the microcontroller's (µC's) $\overline{\text{RESET}}$ pin with a single pull-up resistor allows either device to assert reset (Figure 5).

G675L Open-Drain $\overline{\text{RESET}}$ Output Allows Use with Multiple Supplies

Generally, the pull-up connected to the G675L will connect to the supply voltage that is being monitored at the IC's V_{CC} pin. However, some systems may use the open-drain output to level-shift from the monitored supply to reset circuitry powered by some other supply (Figure 6). Note that as the G675L's V_{CC} decreases below 1V, so does the IC's ability to sink current at $\overline{\text{RESET}}$. Also, with any pull-up, $\overline{\text{RESET}}$ will be pulled high as VCC decays toward 0. The voltage where this occurs depends on the pull-up resistor value and the voltage to which it is connected.

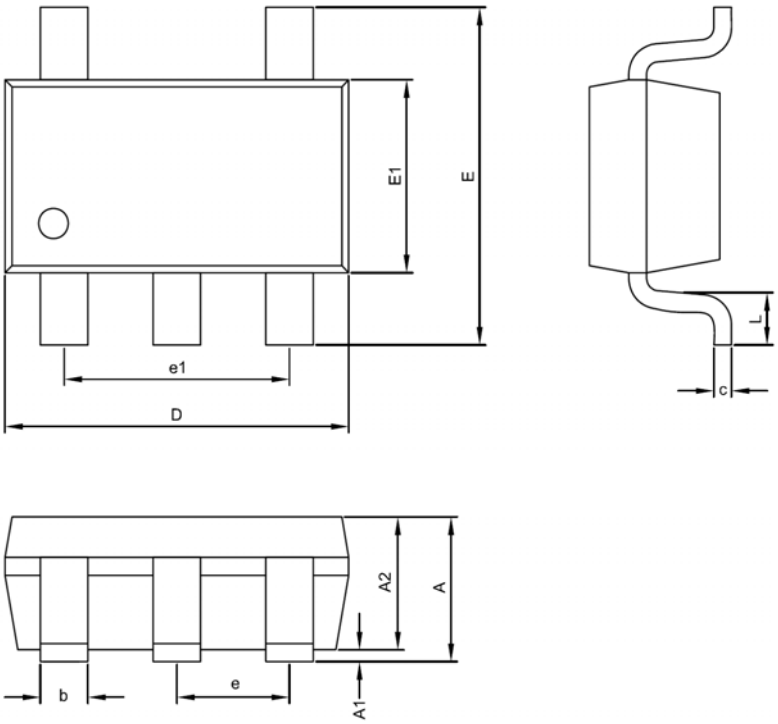
Benefits of Highly Accurate Reset Threshold

Most µP supervisor ICs have reset threshold voltages between 5% and 10% below the value of nominal supply voltages. This ensures a reset will not occur within 5% of the nominal supply, but will occur when the supply is 10% below nominal.

When using ICs rated at only the nominal supply ±5%, this leaves a zone of uncertainty where the supply is between 5% and 10% low, and where the reset may or may not be asserted.

The G67_ _463/G67_ _308 use highly accurate circuitry to ensure that reset is asserted close to the 5% limit, and long before the supply has declined to 10% below nominal.

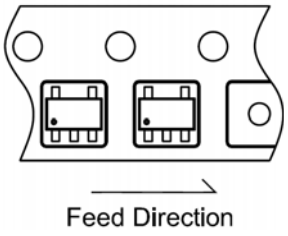
Package Information



SOT-23-5 Package

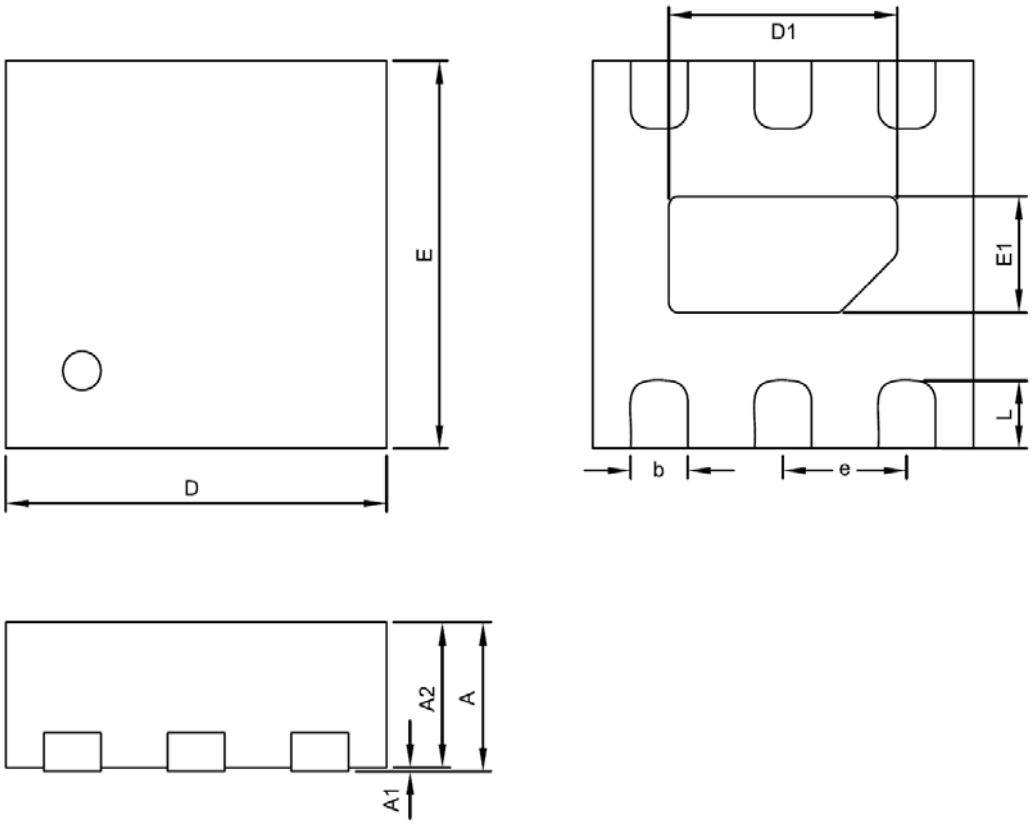
Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00	1.10	1.45	0.039	0.043	0.057
A1	0.00	- - -	0.15	0.000	- - -	0.006
A2	1.00	1.10	1.30	0.039	0.043	0.051
D	2.70	2.90	3.10	0.106	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
c	0.08	0.15	0.25	0.003	0.006	0.010
b	0.30	0.40	0.50	0.012	0.016	0.020
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	0.45	0.60	0.012	0.018	0.024

Taping Specification



PACKAGE	Q'TY/REEL
SOT-23-5	3,000 ea

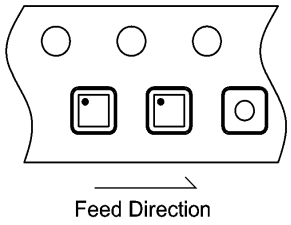
Package Information



TDFN2X2-6 Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.0276	0.0295	0.0315
A1	0.00	---	0.15	0.000	---	0.0059
A2	0.70	0.75	0.80	0.0276	0.0295	0.0315
D	1.95	2.00	2.05	0.0768	0.0787	0.0807
E	1.95	2.00	2.05	0.0768	0.0787	0.0807
D1	1.15	1.20	1.25	0.0453	0.0472	0.0492
E1	0.55	0.60	0.65	0.0217	0.0236	0.0256
b	0.20	0.25	0.30	0.0079	0.0098	0.0118
e	0.65 BSC			0.0256 BSC		
L	0.30	0.35	0.40	0.0118	0.0138	0.0157

Taping Specification



PACKAGE	Q'TY/REEL
TDFN2X2-6	3,000 ea