LP3470 Tiny Power On Reset Circuit

Check for Samples: LP3470

FEATURES

- **Tiny SOT-23-5 Package**
- **Open Drain $\overline{\text{Reset}}$ Output**
- **Programmable Reset Timeout Period Using an External Capacitor**
- **Immune to Short V_{CC} Transients**

APPLICATIONS

- **Critical µP and µC Power Monitoring**
- **Intelligent Instruments**
- **Computers**
- **Portable/Battery-Powered Equipments**

KEY SPECIFICATIONS

- **±1% Reset Threshold Accuracy Over Temperature**
- **Standard Reset Threshold Voltages: 2.63V, 2.93V, 3.08V, 3.65V, 4.00V, 4.38V, and 4.63V**
- **Custom Reset Threshold Voltages: For Other Voltages Between 2.4V and 5.0V Contact Your TI Representative**
- **Very Low Quiescent Current (16 µA typical)**
- **Guaranteed $\overline{\text{Reset}}$ Valid Down to V_{CC}=0.5V**

DESCRIPTION

The LP3470 is a micropower CMOS voltage supervisory circuit designed to monitor power supplies in microprocessor (µP) and other digital systems. It provides maximum adjustability for power-on-reset (POR) and supervisory functions. It is available in the following six standard reset threshold voltage (V_{RTH}) options: 2.63V, 2.93V, 3.08V, 3.65V, 4.00V, 4.38V, and 4.63V. If other voltage options between 2.4V and 5.0V are desired please contact your TI representative.

The LP3470 asserts a reset signal whenever the V_{CC} supply voltage falls below a reset threshold. The reset time-out period is adjustable using an external capacitor. Reset remains asserted for an interval (programmed by an external capacitor) after V_{CC} has risen above the threshold voltage.

The device is available in the tiny SOT-23-5 package.

Pin Configuration and Basic Operating Circuit

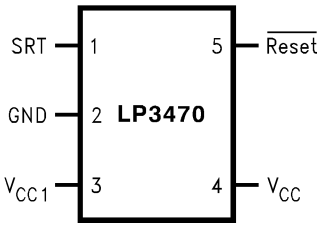


Figure 1. Pin Configuration Top View
See Package Number DBV0005A

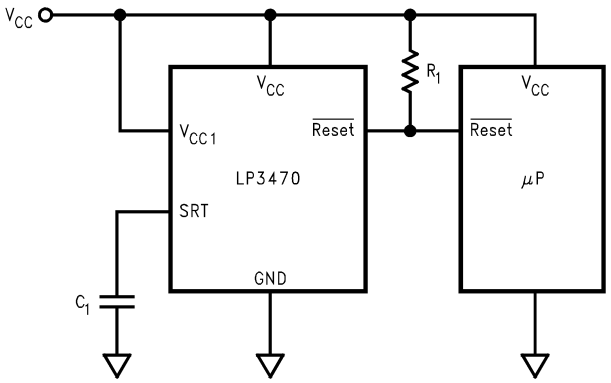


Figure 2. Basic Operating Circuit

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Absolute Maximum Ratings (1)(2)

V_{CC} Voltage		−0.3V to +6V
$\overline{\text{Reset}}$ Voltage		−0.3V to +6V
Output Current ($\overline{\text{Reset}}$)		10 mA
Operating Temperature Range	LP3470	−20°C to +85°C
	LP3470I	−40°C to +85°C
Junction Temperature (T_{Jmax})		125°C
Power Dissipation (T_A = 25°C) (3)		300 mW
θ_{JA} (3)		280°C/W
Storage Temp. Range		−65°C to +150°C
Lead Temp. (Soldering, 5 sec)		260°C
ESD Rating (4)		2 kV

(1) Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Electrical specifications do not apply when operating the device beyond its operating conditions.
(2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/Distributors for availability and specifications.
(3) The maximum power dissipation must be derated at elevated temperatures and is dictated by T_{Jmax} (Maximum Junction Temperature), θ_{JA} (Junction to Ambient Thermal Resistance), and T_A (Ambient Temperature). The maximum allowable power dissipation at any temperature is $P_{Dmax} = (T_{Jmax} - T_A)/\theta_{JA}$ or the number given in the Absolute Maximum Ratings, whichever is lower.
(4) The Human Body Model is a 100 pF capacitor discharged through a 1.5 kΩ resistor into each pin.

Electrical Characteristics

Limits in standard typeface are for T_J = 25°C, and limits in **boldface** type apply over the full operating temperature range, unless otherwise specified. V_{CC} = +2.4V to +5.0V unless otherwise noted.

Symbol	Parameter	Conditions	Typ (1)	Min (2)	Max (2)	Units
V_{CC}	Operating Voltage Range			**0.5**	**5.5**	V
I_{CC}	V_{CC} Supply Current	V_{CC} = 4.5V	16		**30**	µA
V_{RTH}	Reset Threshold Voltage (3)	LP3470	V_{RTH}	0.99 V_{RTH} **0.99 V_{RTH}**	1.01 V_{RTH} **1.01 V_{RTH}**	V
		LP3470I	V_{RTH}	0.99 V_{RTH} **0.985 V_{RTH}**	1.01 V_{RTH} **1.015 V_{RTH}**	
V_{HYST}	Hysteresis Voltage (4)		35	**15**	**65**	mV
t_{PD}	V_{CC} to Reset Delay	V_{CC} falling at 1 mV/µs	100		**300**	µs
t_{RP}	Reset Timeout Period (5)	C_1 = 1 nF	2	**1.0**	**3.5**	ms
V_{OL}	Reset Output Voltage Low	V_{CC} = 0.5V; I_{OL} = 30 µA			**0.1**	V
		V_{CC} = 1.0V; I_{OL} = 100 µA			**0.1**	
		V_{CC} = V_{RTH} −100 mV; I_{OL} = 4 mA			**0.4**	
R_1	External Pull-up Resistor		20	0.68	68	kΩ
I_{LEAK}	Reset Output Leakage Current		0.15		1 **6**	µA

(1) Typical numbers are at 25°C and represent the most likely parametric norm.
(2) Min. and Max. limits in standard typeface are 100% production tested at 25°C. Min. and Max. limits in boldface are guaranteed through correlation using Statistical Quality Control (SQC) methods. The limits are used to calculate TI's Average Outgoing Quality Level (AOQL).
(3) Factory-trimmed reset thresholds are available in 50 mV increments from 2.4V to 5.0V. Contact your TI representative.
(4) V_{HYST} affects the relation between V_{CC} and $\overline{\text{Reset}}$ as shown in the timing diagram.
(5) t_{RP} is programmable by varying the value of the external capacitor (C_1) connected to pin SRT. The equation is: $t_{RP} = 2000 \times C_1$ (C_1 in µF and t_{RP} in ms).

Typical Operating Characteristics

T_A = +25°C, unless otherwise specified.

I_{CC} vs Temperature

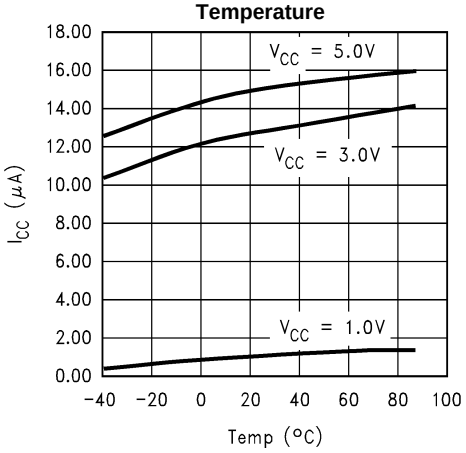


Figure 3.

I_{CC} vs V_{CC}

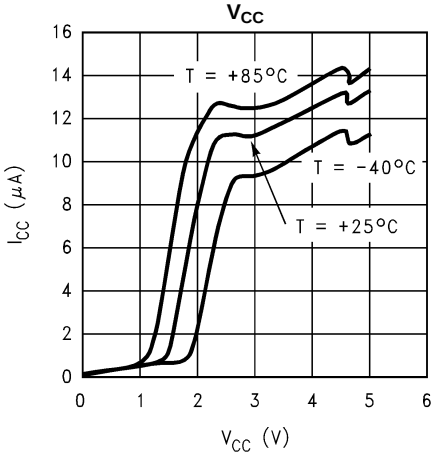


Figure 4.

V_{CC} to Reset Delay vs Temp

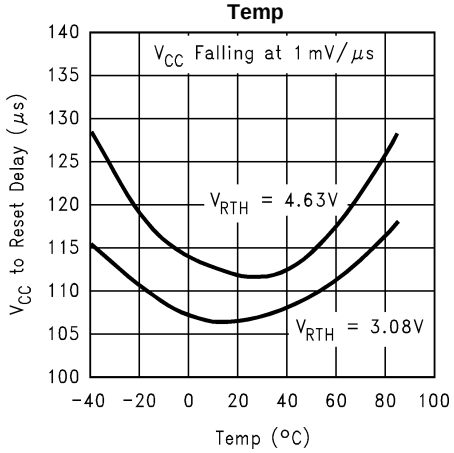


Figure 5.

Normalized t_{RP} vs Temp.

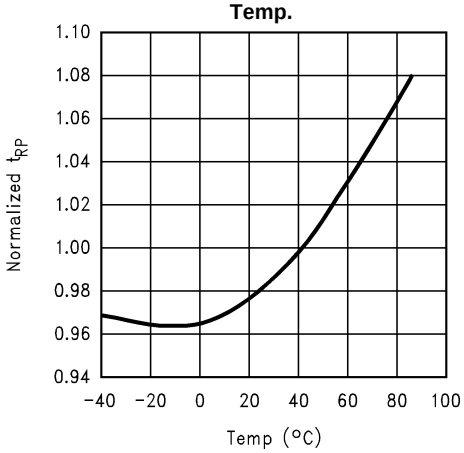


Figure 6.

Normalized V_{RTH} vs Temp.

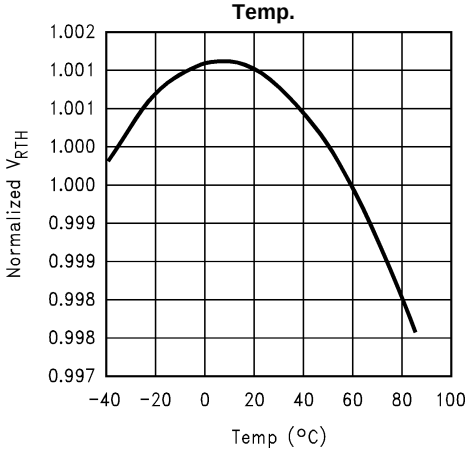


Figure 7.

Transient Rejection

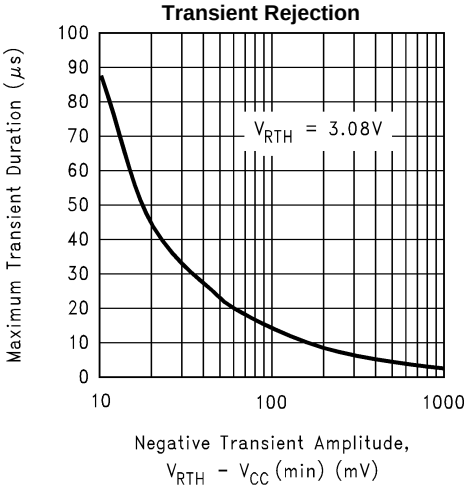


Figure 8.

Typical Operating Characteristics (continued)

T_A = +25°C, unless otherwise specified.

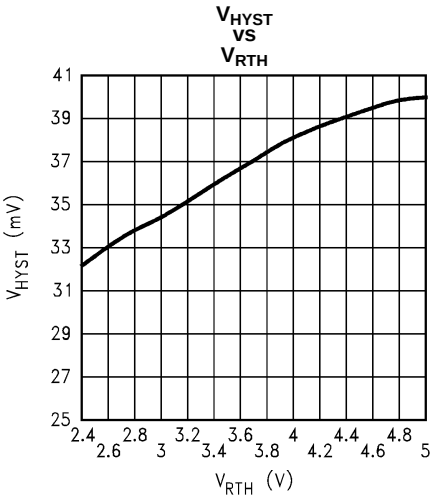


Figure 9.

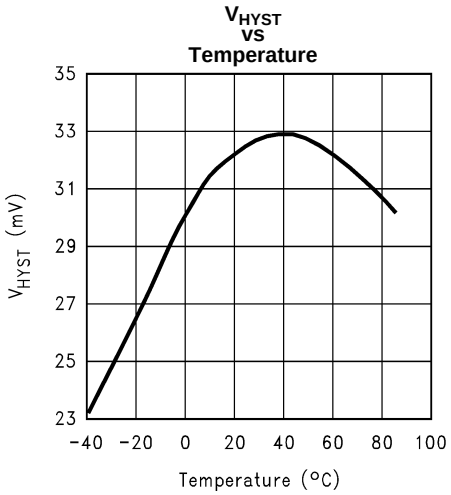
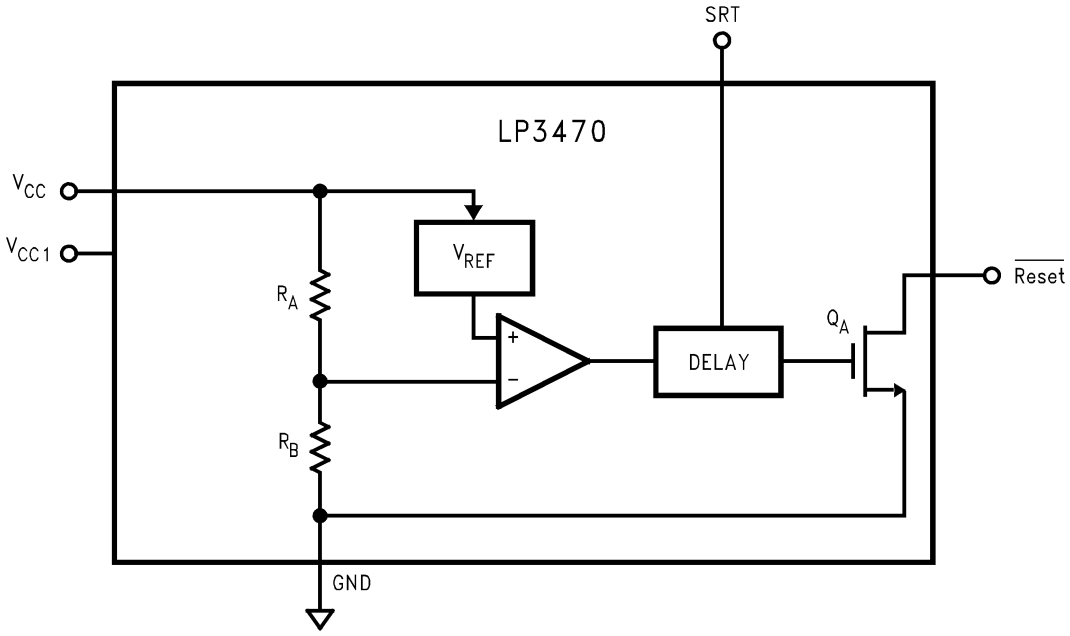


Figure 10.

PIN DESCRIPTIONS

Pin	Name	Function
1	SRT	Set Reset Time-out Input. Connect a capacitor between this input and ground to select the Reset Time-out period (t_{RP}). t_{RP} = 2000 x C_1 (C_1 in µF and t_{RP} in ms). If no capacitor is connected, leave this pin floating.
2	GND	Ground pin.
3	V_{CC1}	Always connect to pin V_{CC} (Pin 4).
4	V_{CC}	Supply voltage, and reset threshold monitor input.
5	$\overline{\text{Reset}}$	Open-Drain, Active-Low reset output. Connect to an external pull-up resistor. $\overline{\text{Reset}}$ changes from high to low whenever the monitored voltage (V_{CC}) drops below the reset threshold voltage (V_{RTH}). Once V_{CC} exceeds V_{RTH}, $\overline{\text{Reset}}$ remains low for the reset timeout period (t_{RP}) and then goes high.

Functional Block Diagram



APPLICATION INFORMATION

RESET TIMEOUT PERIOD

The Reset Timeout Period (t_{RP}) is programmable using an external capacitor (C_1) connected to pin SRT of LP3470. A Ceramic chip capacitor rated at or above 10V is sufficient. The Reset Timeout Period (t_{RP}) can be calculated using the following formula:

$$t_{RP}\ (ms) = 2000 \times C_1\ (\mu F). \quad (1)$$

For example a C_1 of 100 nF will achieve a t_{RP} of 200 ms. If no delay due to t_{RP} is needed in a certain application, the pin SRT should be left floating.

RESET OUTPUT

In applications like microprocessor (µP) systems, errors might occur in system operation during power-up, power-down, or brownout conditions. It is imperative to monitor the power supply voltage in order to prevent these errors from occurring.

The LP3470 asserts a reset signal whenever the V_{CC} supply voltage is below a threshold (V_{RTH}) voltage. $\overline{\text{Reset}}$ is guaranteed to be a logic low for V_{CC} > 0.5V. Once V_{CC} exceeds the reset threshold, the reset is kept asserted for a time period (t_{RP}) programmed by an external capacitor (C_1); after this interval $\overline{\text{Reset}}$ goes to logic high. If a brownout condition occurs (monitored voltage falls below the reset threshold minus a small hysteresis), $\overline{\text{Reset}}$ goes low. When V_{CC} returns above the reset threshold, $\overline{\text{Reset}}$ remains low for a time period t_{RP} before going to logic high.

PULL-UP RESISTOR SELECTION

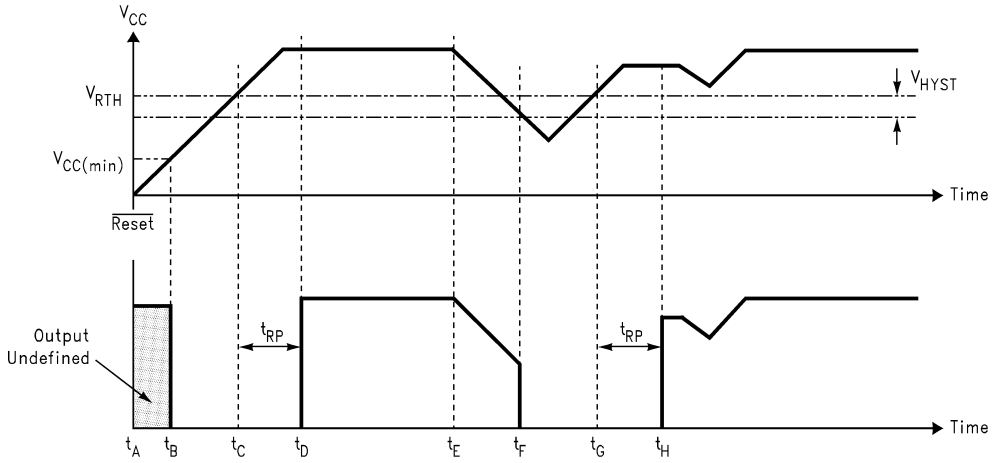
The LP3470's $\overline{\text{Reset}}$ output structure is a simple open-drain N-channel MOSFET switch. A pull-up resistor (R_1) should be connected to V_{CC}.

R_1 should be large enough to limit the current through the output MOSFET (Q_1) below 10 mA. A resistor value of more than 680Ω guarantees this. R_1 should also be small enough to ensure a logic high while supplying all the leakage current through the $\overline{\text{Reset}}$ pin. A resistor value of less than 68kΩ satisfies this condition. A typical pull-up resistor value of 20 kΩ is sufficient in most applications.

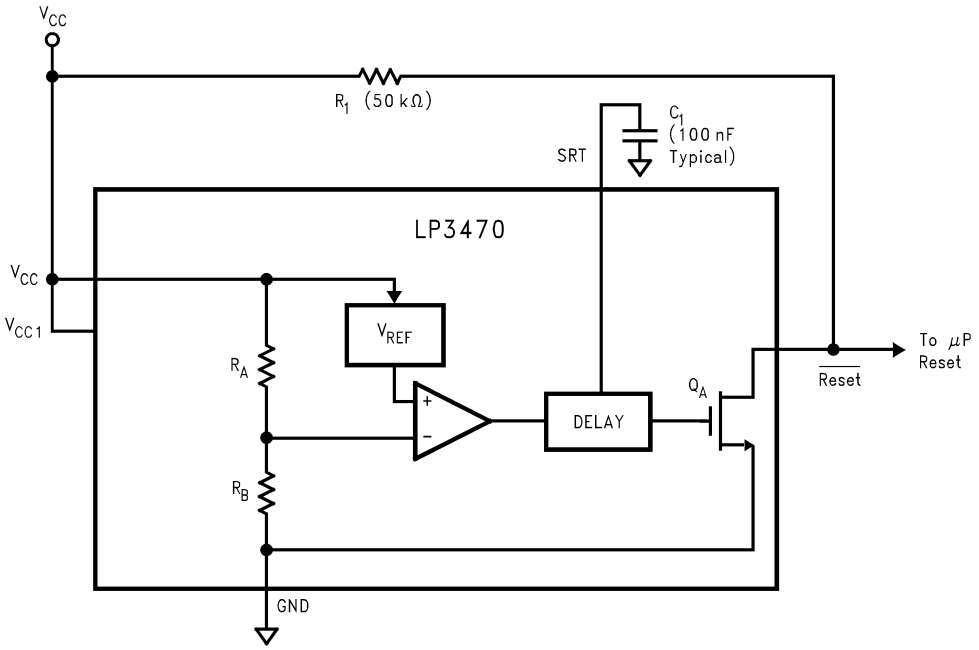
NEGATIVE-GOING V_{CC} TRANSIENTS

The LP3470 is relatively immune to short duration negative-going V_{CC} transients (glitches). The Typical Operating Characteristics show the Maximum Transient Duration vs. Negative Transient Amplitude (graph titled Transient Rejection), for which reset pulses are not generated. This graph shows the maximum pulse width a negative-going V_{CC} transient may typically have without causing a reset pulse to be issued. As the transient amplitude increases (i.e. goes farther below the reset threshold), the maximum allowable pulse width decreases. A 0.1 µF bypass capacitor mounted close to V_{CC} provides additional transient immunity.

Timing Diagram



Typical Application Circuit



PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
LP3470IM5-2.63	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D25C	Samples
LP3470IM5-2.63/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D25C	Samples
LP3470IM5-2.75	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI		D38C	Samples
LP3470IM5-2.75/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM		D38C	Samples
LP3470IM5-2.83	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI		D39C	Samples
LP3470IM5-2.83/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM		D39C	Samples
LP3470IM5-2.93	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D26C	Samples
LP3470IM5-2.93/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D26C	Samples
LP3470IM5-3.08	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D28C	Samples
LP3470IM5-3.08/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D28C	Samples
LP3470IM5-3.65	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D37C	Samples
LP3470IM5-3.65/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D37C	Samples
LP3470IM5-4.00	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D29C	Samples
LP3470IM5-4.00/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D29C	Samples
LP3470IM5-4.38	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D30C	Samples
LP3470IM5-4.38/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D30C	Samples
LP3470IM5-4.63	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D31C	Samples
LP3470IM5-4.63/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D31C	Samples
LP3470IM5-4.8	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI		D15C	Samples

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
LP3470IM5-4.8/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM		D15C	Samples
LP3470IM5X-2.63	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-20 to 85	D25C	Samples
LP3470IM5X-2.63/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D25C	Samples
LP3470IM5X-2.83	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI		D39C	Samples
LP3470IM5X-2.83/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM		D39C	Samples
LP3470IM5X-2.93	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-20 to 85	D26C	Samples
LP3470IM5X-2.93/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D26C	Samples
LP3470IM5X-3.08	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-20 to 85	D28C	Samples
LP3470IM5X-3.08/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D28C	Samples
LP3470IM5X-4.00	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-20 to 85	D29C	Samples
LP3470IM5X-4.00/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D29C	Samples
LP3470IM5X-4.38	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-20 to 85	D30C	Samples
LP3470IM5X-4.38/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D30C	Samples
LP3470IM5X-4.63	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-20 to 85	D31C	Samples
LP3470IM5X-4.63/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D31C	Samples
LP3470M5-2.63	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D25B	Samples
LP3470M5-2.63/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D25B	Samples
LP3470M5-2.93	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D26B	Samples
LP3470M5-2.93/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D26B	Samples

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
LP3470M5-3.08	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D28B	Samples
LP3470M5-3.08/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D28B	Samples
LP3470M5-4.00	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D29B	Samples
LP3470M5-4.00/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D29B	Samples
LP3470M5-4.38	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D30B	Samples
LP3470M5-4.38/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D30B	Samples
LP3470M5-4.63	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-20 to 85	D31B	Samples
LP3470M5-4.63/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D31B	Samples
LP3470M5X-2.93	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-20 to 85	D26B	Samples
LP3470M5X-2.93/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D26B	Samples
LP3470M5X-3.08	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-20 to 85	D28B	Samples
LP3470M5X-3.08/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D28B	Samples
LP3470M5X-4.00	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-20 to 85	D29B	Samples
LP3470M5X-4.00/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D29B	Samples
LP3470M5X-4.63	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-20 to 85	D31B	Samples
LP3470M5X-4.63/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-20 to 85	D31B	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

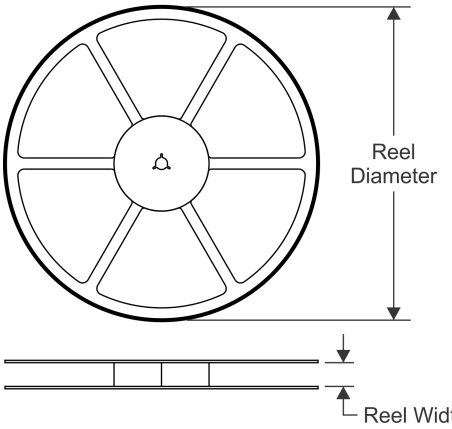
(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

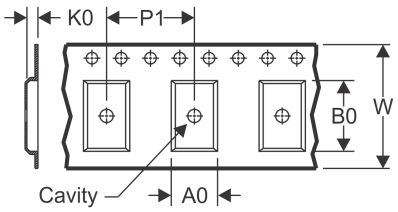
(4) Only one of markings shown within the brackets will appear on the physical device.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

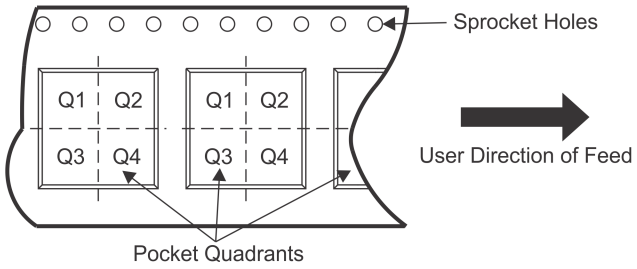


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

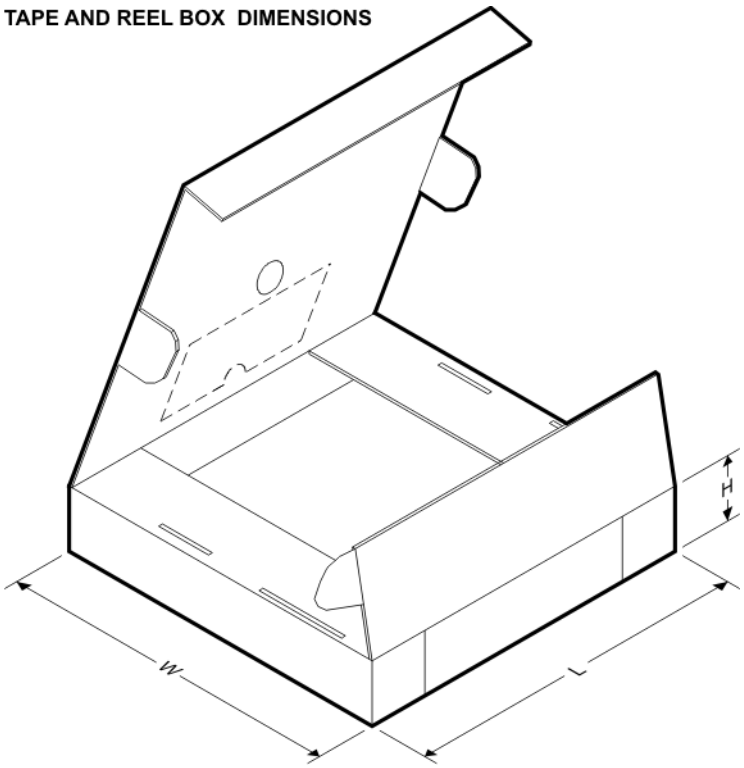


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LP3470IM5-2.63	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-2.63/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-2.75	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-2.75/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-2.83	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-2.83/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-2.93	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-2.93/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-3.08	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-3.08/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-3.65	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-3.65/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-4.00	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-4.00/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-4.38	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-4.38/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-4.63	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-4.63/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LP3470IM5-4.8	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5-4.8/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-2.63	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-2.63/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-2.83	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-2.83/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-2.93	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-2.93/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-3.08	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-3.08/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-4.00	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-4.00/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-4.38	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-4.38/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-4.63	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470IM5X-4.63/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-2.63	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-2.63/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-2.93	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-2.93/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-3.08	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-3.08/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-4.00	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-4.00/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-4.38	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-4.38/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-4.63	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5-4.63/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5X-2.93	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5X-2.93/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5X-3.08	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5X-3.08/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5X-4.00	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5X-4.00/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5X-4.63	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LP3470M5X-4.63/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS

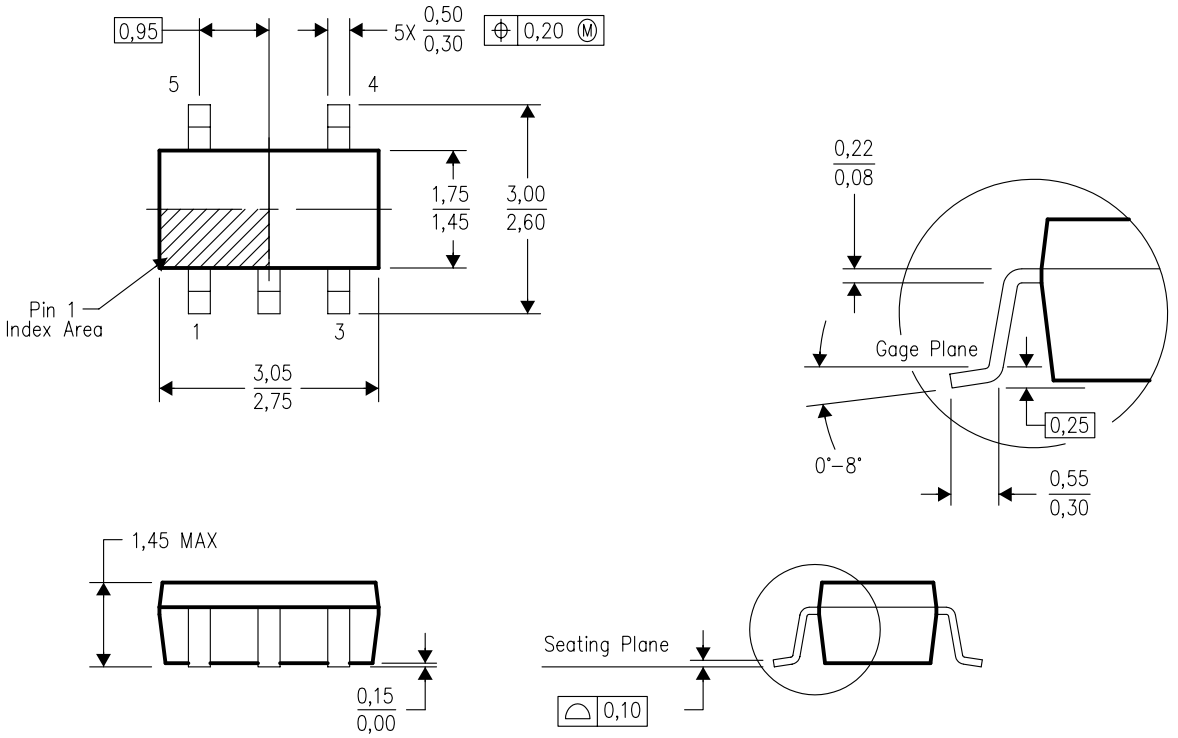


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LP3470IM5-2.63	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-2.63/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-2.75	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-2.75/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-2.83	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-2.83/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-2.93	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-2.93/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-3.08	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-3.08/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-3.65	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-3.65/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-4.00	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-4.00/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-4.38	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-4.38/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-4.63	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-4.63/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-4.8	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470IM5-4.8/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LP3470IM5X-2.63	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-2.63/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-2.83	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-2.83/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-2.93	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-2.93/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-3.08	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-3.08/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-4.00	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-4.00/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-4.38	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-4.38/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-4.63	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470IM5X-4.63/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470M5-2.63	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-2.63/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-2.93	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-2.93/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-3.08	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-3.08/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-4.00	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-4.00/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-4.38	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-4.38/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-4.63	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5-4.63/NOPB	SOT-23	DBV	5	1000	203.0	190.0	41.0
LP3470M5X-2.93	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470M5X-2.93/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470M5X-3.08	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470M5X-3.08/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470M5X-4.00	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470M5X-4.00/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470M5X-4.63	SOT-23	DBV	5	3000	206.0	191.0	90.0
LP3470M5X-4.63/NOPB	SOT-23	DBV	5	3000	206.0	191.0	90.0

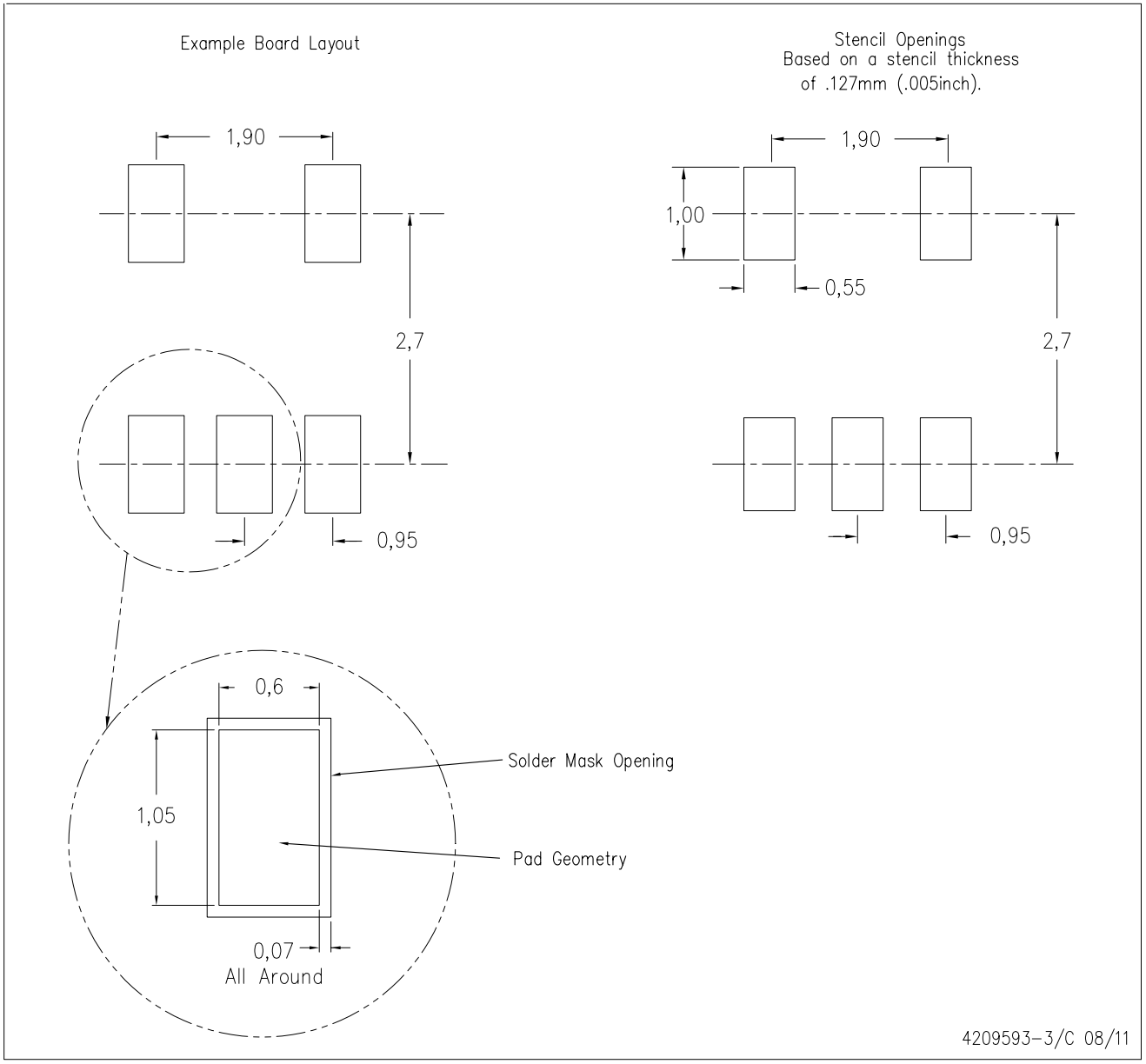
DBV (R–PDSO–G5) PLASTIC SMALL–OUTLINE PACKAGE



4073253–4/K 03/2006

NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
D. Falls within JEDEC MO–178 Variation AA.

DBV (R–PDSO–G5) PLASTIC SMALL OUTLINE



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
D. Publication IPC–7351 is recommended for alternate designs.
E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC–7525 for other stencil recommendations.

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