

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

- $\pm 1\%$ 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)
- $\overline{\text{Reset}}$ Valid Down to $V_{CC}=0.5\text{V}$

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

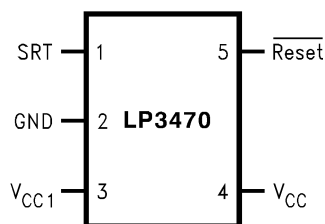


Figure 1. Pin Configuration Top View
See Package Number DBV0005A

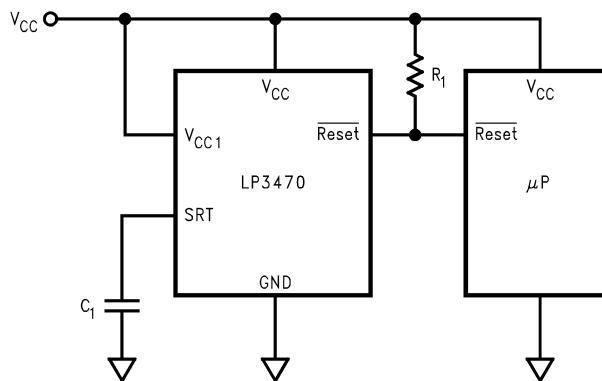


Figure 2. Basic Operating Circuit



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

All trademarks are the property of their respective owners.



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
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) / θ_{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	μA
					6	

- (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 ensured 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 Reset as shown in the timing diagram.
- (5) t_{RP} is programmable by varying the value of the external capacitor (C₁) connected to pin SRT. The equation is: t_{RP} = 2000 × C₁ (C₁ in μF and t_{RP} in ms).

Typical Operating Characteristics

$T_A = +25^\circ\text{C}$, unless otherwise specified.

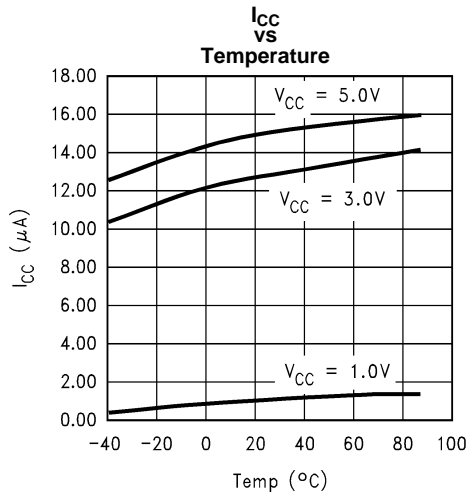


Figure 3.

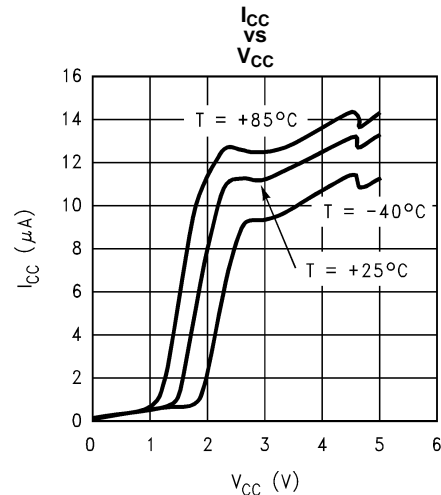


Figure 4.

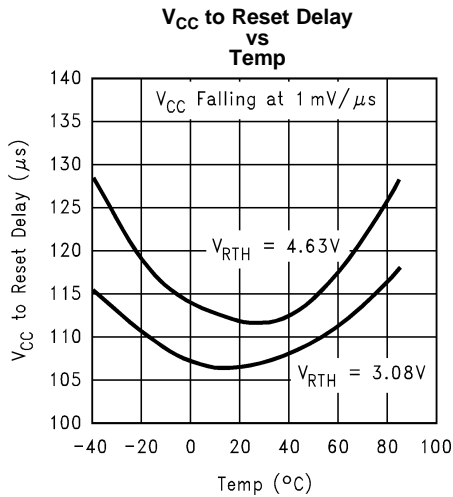


Figure 5.

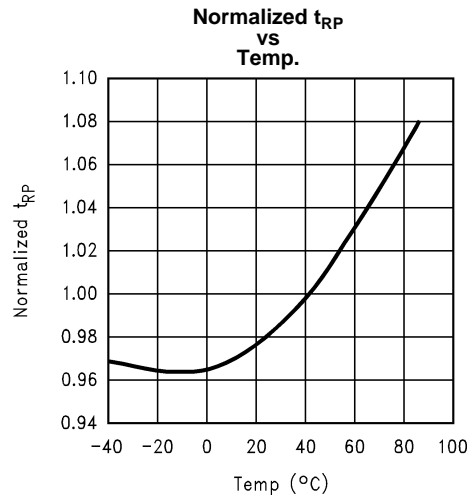


Figure 6.

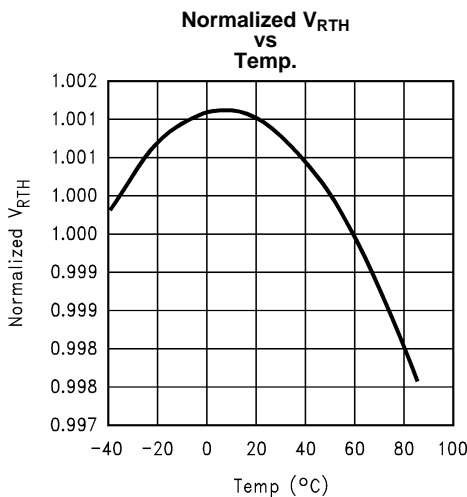


Figure 7.

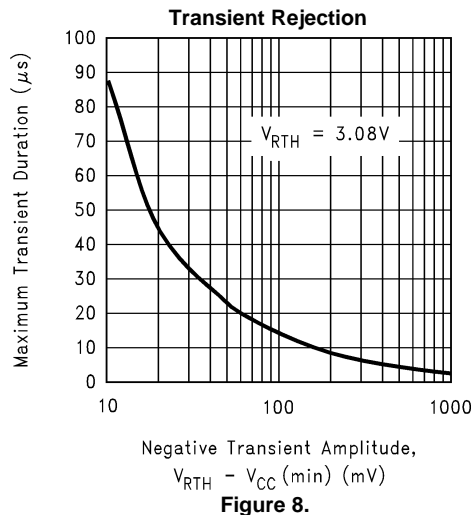


Figure 8.

Typical Operating Characteristics (continued)

T_A = +25°C, unless otherwise specified.

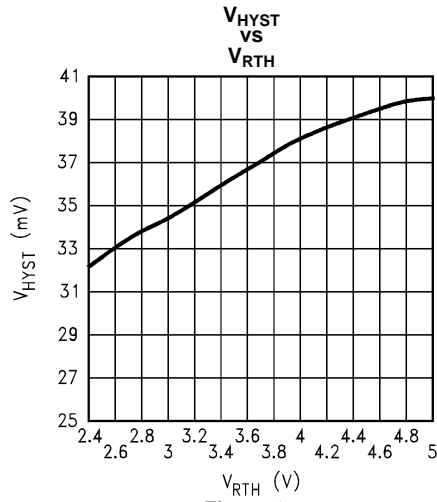


Figure 9.

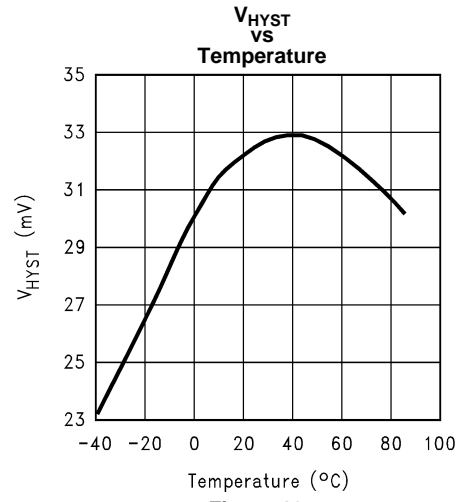


Figure 10.

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}). $t_{RP} = 2000 \times C_1$ (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

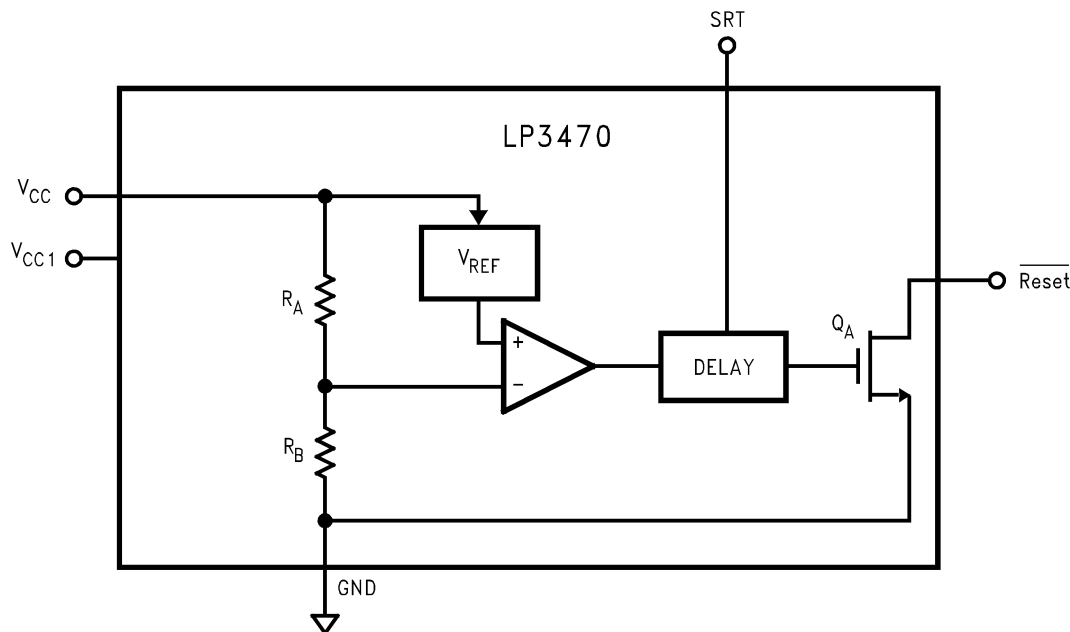


Figure 11.

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:

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

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 ensured to be a logic low for $V_{CC} > 0.5\text{V}$. 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 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 ensures this. R_1 should also be small enough to ensure a logic high while supplying all the leakage current through the Reset pin. A resistor value of less than $68\text{k}\Omega$ satisfies this condition. A typical pull-up resistor value of $20\text{ k}\Omega$ 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 $0.1\ \mu\text{F}$ bypass capacitor mounted close to V_{CC} provides additional transient immunity.

Timing Diagram

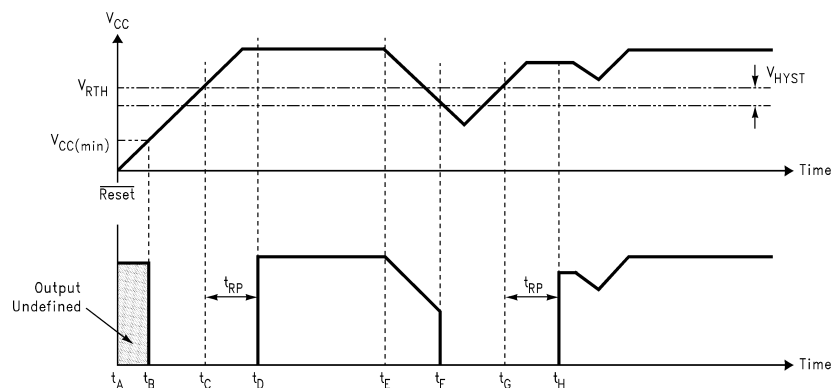


Figure 12.

Typical Application Circuit

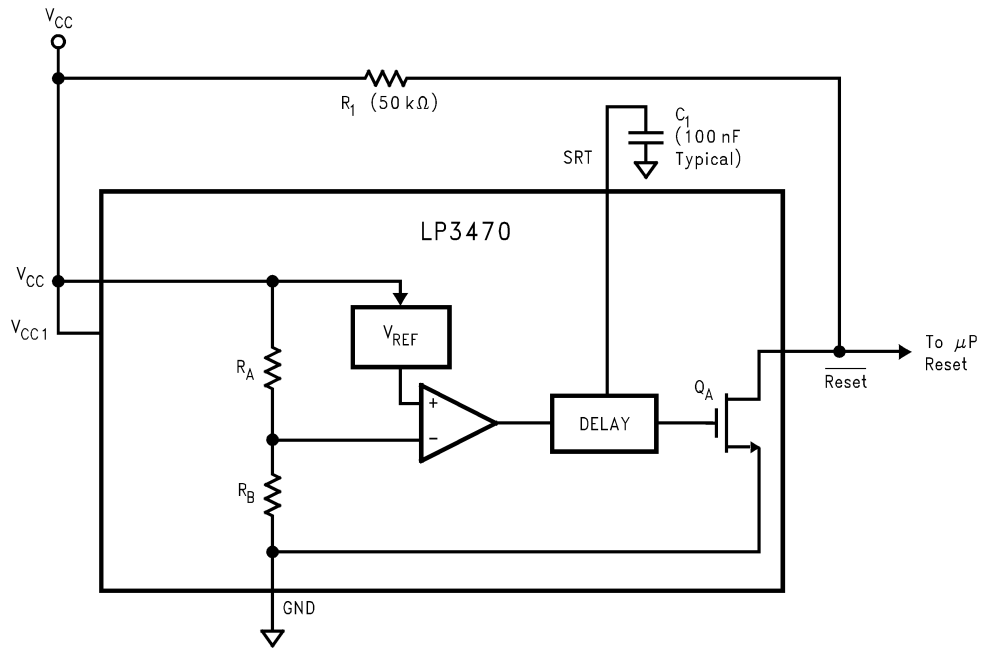


Figure 13.

REVISION HISTORY

Changes from Revision E (March 2013) to Revision F	Page
• Changed layout of National Data Sheet to TI format	7

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	-40 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	-40 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	-40 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	-40 to 85	D26C	Samples
LP3470IM5-3.08	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-40 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	-40 to 85	D28C	Samples
LP3470IM5-3.65	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-40 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	-40 to 85	D37C	Samples
LP3470IM5-4.00	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-40 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	-40 to 85	D29C	Samples
LP3470IM5-4.38	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-40 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	-40 to 85	D30C	Samples
LP3470IM5-4.63	ACTIVE	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-40 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	-40 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	-40 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	-40 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	-40 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	-40 to 85	D26C	Samples
LP3470IM5X-3.08	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-40 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	-40 to 85	D28C	Samples
LP3470IM5X-4.00	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-40 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	-40 to 85	D29C	Samples
LP3470IM5X-4.38	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-40 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	-40 to 85	D30C	Samples
LP3470IM5X-4.63	ACTIVE	SOT-23	DBV	5	3000	TBD	Call TI	Call TI	-40 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	-40 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.

OBSELETE: 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)

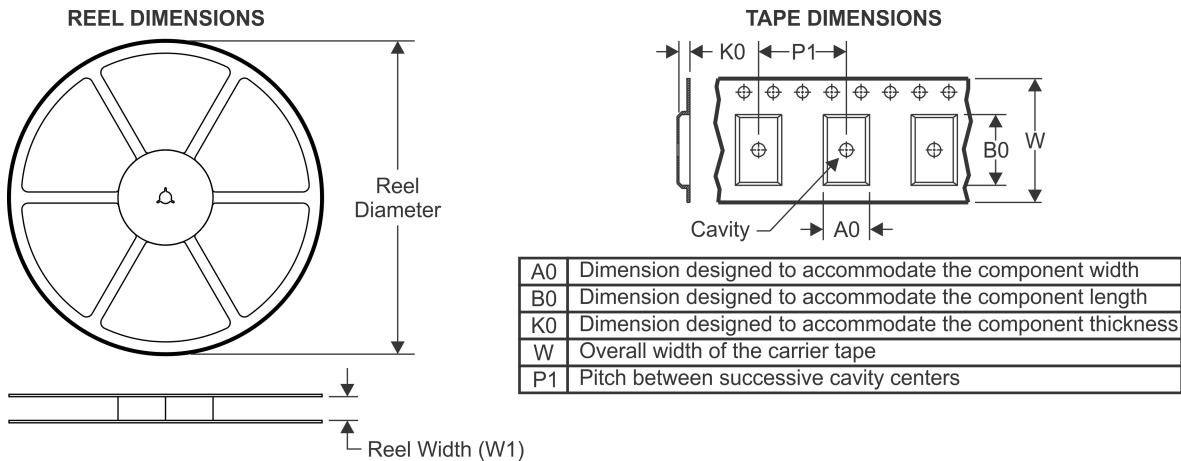
(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION



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	210.0	185.0	35.0
LP3470IM5-2.63/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-2.75	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-2.75/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-2.83	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-2.83/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-2.93	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-2.93/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-3.08	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-3.08/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-3.65	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-3.65/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-4.00	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-4.00/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-4.38	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-4.38/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-4.63	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-4.63/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-4.8	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470IM5-4.8/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LP3470IM5X-2.63	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-2.63/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-2.83	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-2.83/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-2.93	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-2.93/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-3.08	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-3.08/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-4.00	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-4.00/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-4.38	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-4.38/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-4.63	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470IM5X-4.63/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470M5-2.63	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-2.63/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-2.93	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-2.93/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-3.08	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-3.08/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-4.00	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-4.00/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-4.38	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-4.38/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-4.63	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5-4.63/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LP3470M5X-2.93	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470M5X-2.93/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470M5X-3.08	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470M5X-3.08/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470M5X-4.00	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470M5X-4.00/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470M5X-4.63	SOT-23	DBV	5	3000	210.0	185.0	35.0
LP3470M5X-4.63/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0

DBV (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE



- 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.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com