LMS33460 3V Under Voltage Detector

Check for Samples: LMS33460

FEATURES

- **Ultra Low Power**
- **3.0V Detection**
- **V_{IN} Range: 0.8V to 7.0V**
- **Open Drain Output**
- **Ultra-small SC70-5 Package**
- **Extended Temperature Range (−40°C to 85°C)**
- **Ultra Low Quiescent Current (1µA typ)**

APPLICATIONS

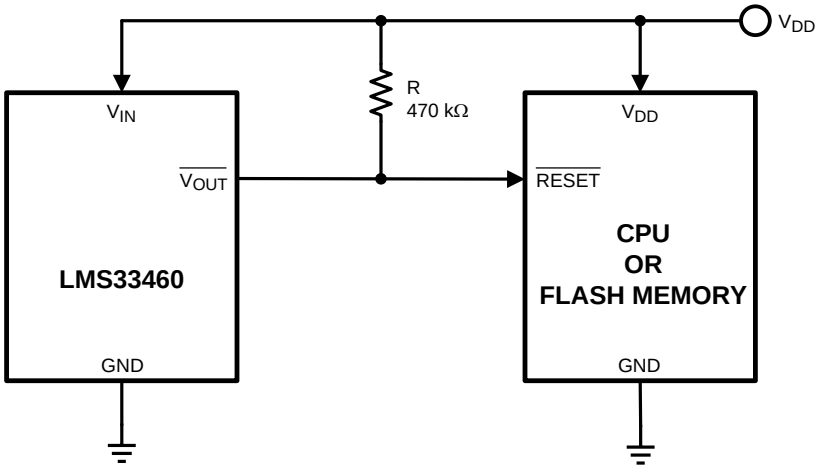
- **Low Battery Voltage Detector**
- **Power Fail Indicator**
- **Processor Reset Generator**
- **Battery Backup Control**
- **Battery Operated Equipment**
- **Hand-held Instruments**

DESCRIPTION

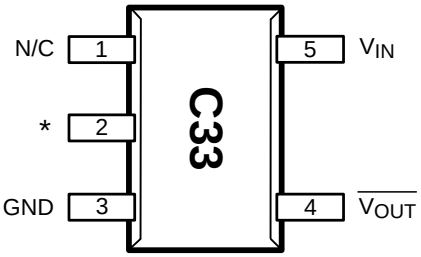
The LMS33460 is an under voltage detector with a 3.0V threshold and extremely low power consumption. The LMS33460 is specifically designed to accurately monitor power supplies. It is especially suited to battery powered systems where low quiescent current and small size are required. This IC generates an active output whenever the input voltage drops below 3.0 Volts.

This part uses a precision on-chip voltage reference and a comparator to measure the input voltage. Built in hysteresis helps to prevent erratic operation in the presence of noise. The UVD is available in the ultra-miniature SC70-5 package.

Typical Application



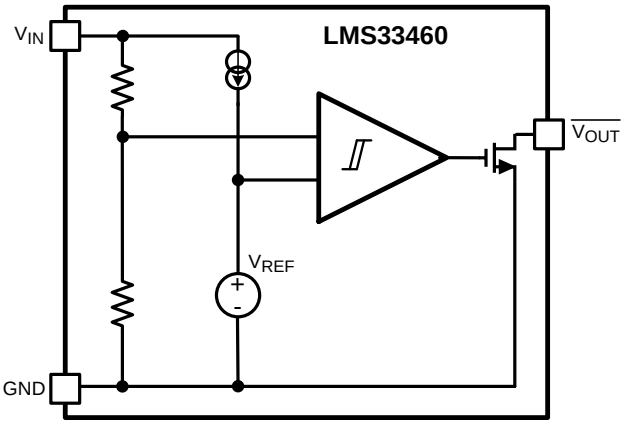
Connection Diagram



* Pin 2 is internally connected to Pin 3 (GND).
Pin 2 should be left open or connected to ground.

Figure 1. SC70-5
Top View

Block Diagram



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)

Input Voltage to GND	8.0V
Output Voltage to GND	8.0V
Output Continuous Output Current	30mA
Vapor Phase IR Convection Reflow	240°C
ESD Rating (2)	
Human Body Model	2500V
Machine Model	200V
T_{JMAX} (3)	150°C
θ_{JA} (3)	478°C/W

(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 rated operating conditions.
(2) Human Body Model (HBM): 1.5kΩ in series with 100pF; Machine Model (MM): 0Ω in series with 200pF.
(3) Quiescent current will increase substantially above 5.5 volts, but is very low in the normal range below 5.5 volts.

TEMPERATURE RANGE

Operating Junction	−40°C to +85°C
Storage Temperature Range	−65°C to +150°C

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, all limits specified for T_J = 25°C. **Boldface** limits apply at the temperature extremes.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{DET}	Detector Threshold	V_{IN} Falling	2.85	3.0	3.15	V
V_{HYS}	Detector Voltage Hysteresis	V_{IN} Rising	0.095	0.155	0.215	V
I_{IN}	Input Supply Current	V_{IN} = 2.87V	–	1.0	2.2	µA
		V_{IN} = 4.7V	–	1.2	3.6	µA
		V_{IN} = 7.0V (1)	–	25	200	µA
$V_{IN(MAX)}$	Maximum Operating Voltage		–	–	7.0	V
$V_{IN(MIN)}$	Minimum Operating Voltage (2)		–	0.7 **1.0**	1.1 **1.3**	V
$I_{OUT(LOW)}$	Output Current Low	V_{OUT} = 0.05V, V_{IN} = 1.1V V_{OUT} = 0.50V, V_{IN} = 1.5V	0.01 2	0.6 11	–	mA
t_{PDHL}	Output Delay Time Output Transition High to Low C_L = 10pF, R_L = 470kΩ		–	130	200	µsec
$\Delta V_{DET}/\Delta T$	Detect Voltage Temperature Coefficient		–	**±120**	–	PPM/°C

(1) Quiescent current will increase substantially above 5.5 volts, but is very low in the normal range below 5.5 volts.
(2) Temperature range specifications is specified by design.

TYPICAL CHARACTERISTICS

(T_A = 25°C, R_L = 470 kΩ and C_L = 10 pF unless otherwise noted).

Detector Threshold vs. Temperature

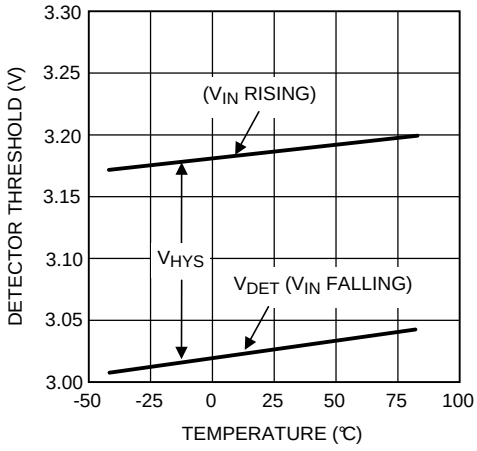


Figure 2.

Supply Current vs. Input Voltage

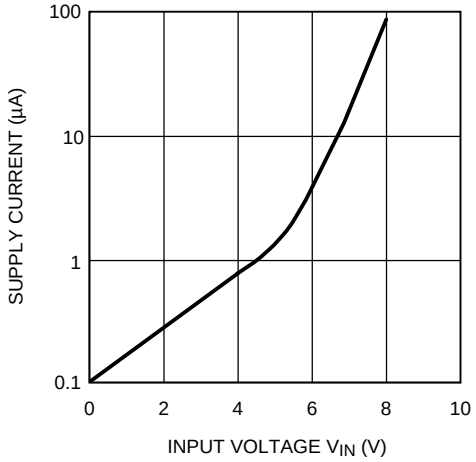


Figure 3.

Propagation Delay Time (t_{PDHL}) vs. Temperature

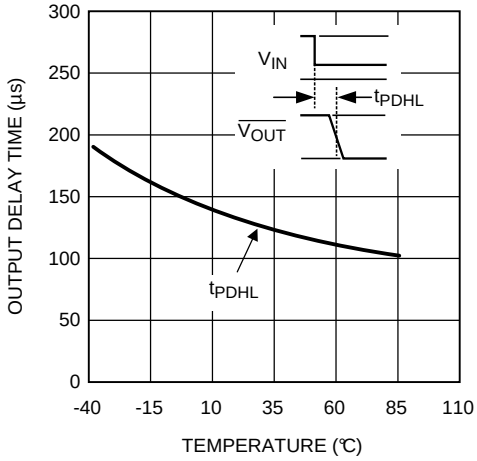


Figure 4.

Propagation Delay Time (t_{PDLH}) vs. Temperature

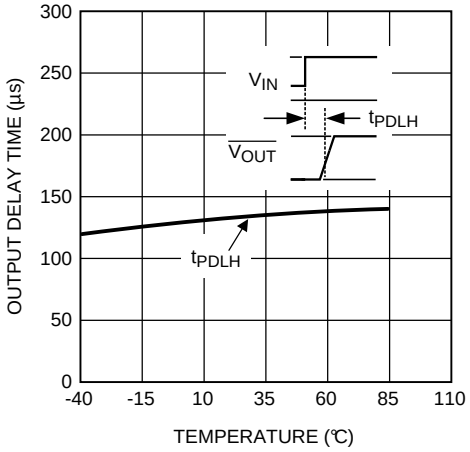


Figure 5.

$V_{OUT(LOW)}$ vs. V_{IN}

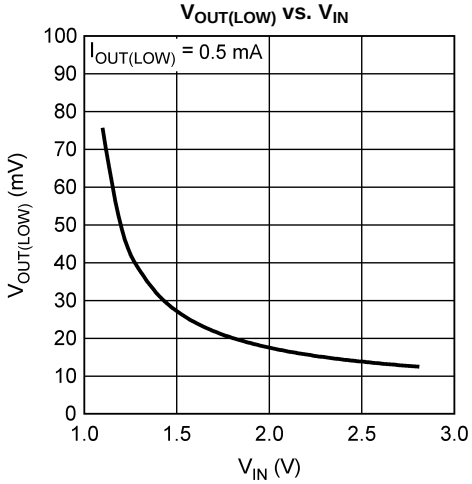


Figure 6.

APPLICATION CIRCUIT INFORMATION

The LMS33460 is a micro power under voltage sensing circuit with an open drain output configuration, which requires a pull resistor.

The LMS33460 features a voltage reference, a comparator with precise thresholds and built in hysteresis to prevent erratic reset operation.

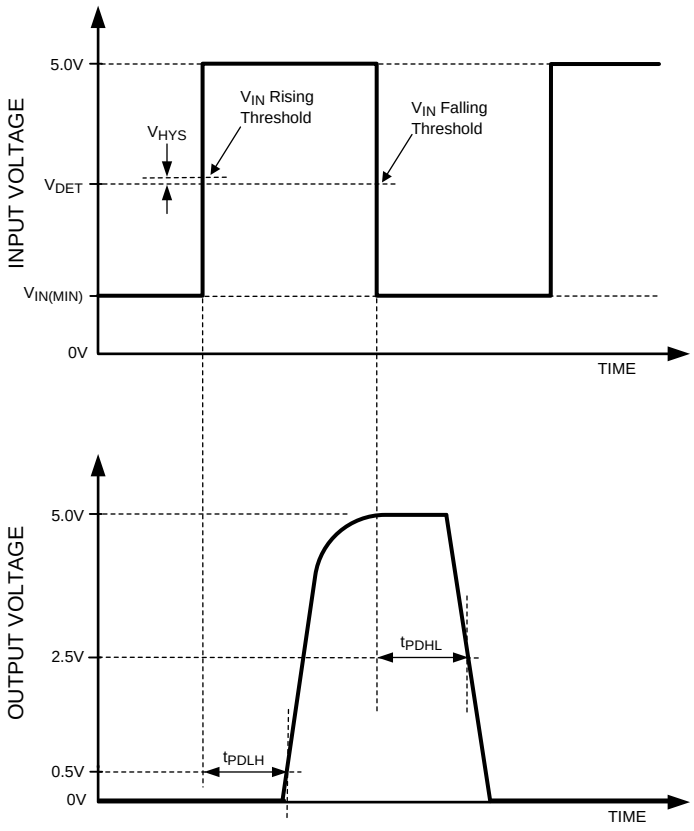


Figure 7. Propagation Delay Timing Diagram

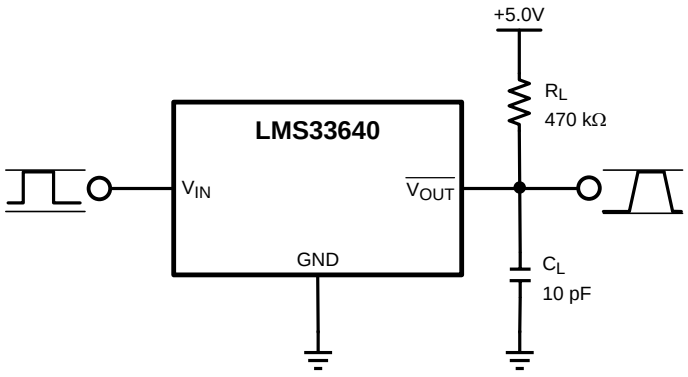


Figure 8. Propagation Delay Test Circuit

REVISION HISTORY

Changes from Revision C (April 2013) to Revision D	Page
• Changed layout of National Data Sheet to TI format	5

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LMS33460MG	NRND	SC70	DCK	5	1000	TBD	Call TI	Call TI	-40 to 85	C33	
LMS33460MG/NOPB	ACTIVE	SC70	DCK	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 85	C33	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) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

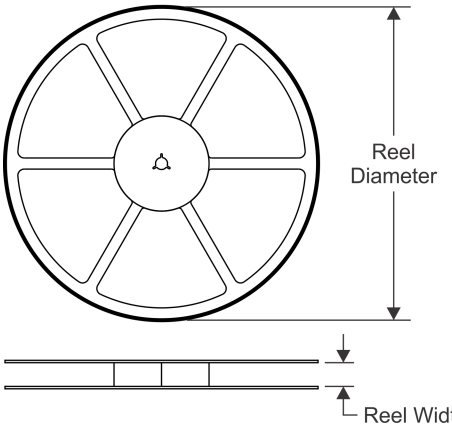
(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

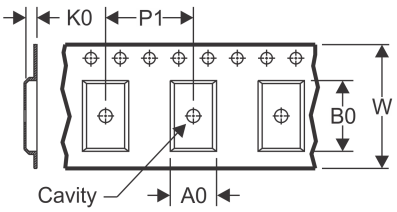
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

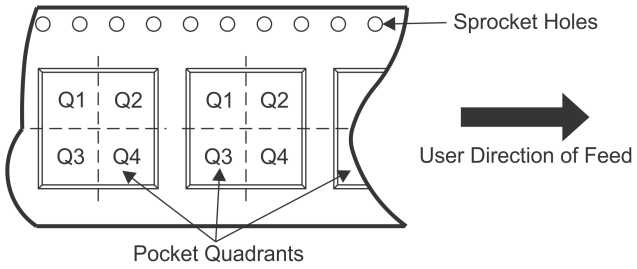


TAPE DIMENSIONS



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

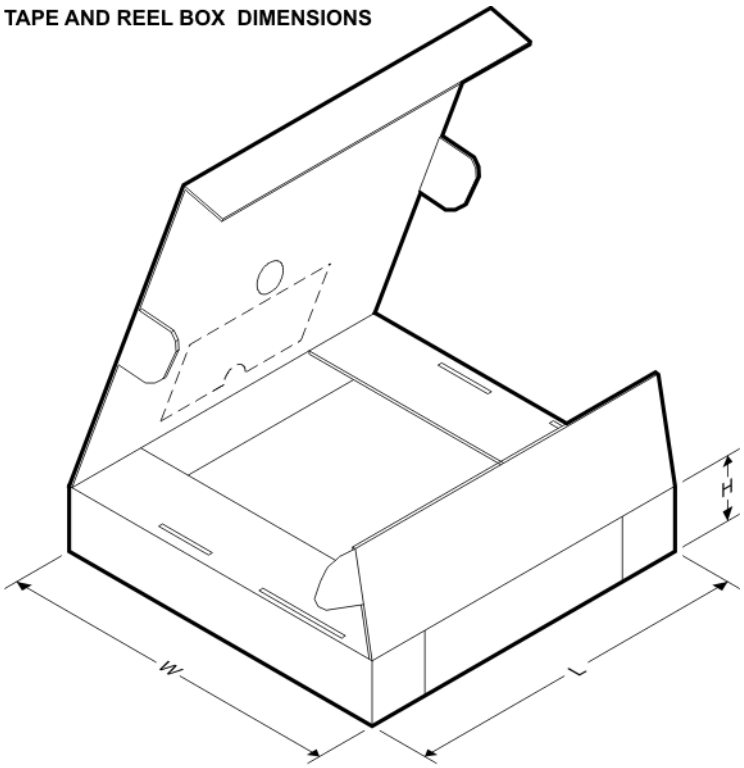
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
LMS33460MG	SC70	DCK	5	1000	178.0	8.4	2.25	2.45	1.2	4.0	8.0	Q3
LMS33460MG/NOPB	SC70	DCK	5	1000	178.0	8.4	2.25	2.45	1.2	4.0	8.0	Q3

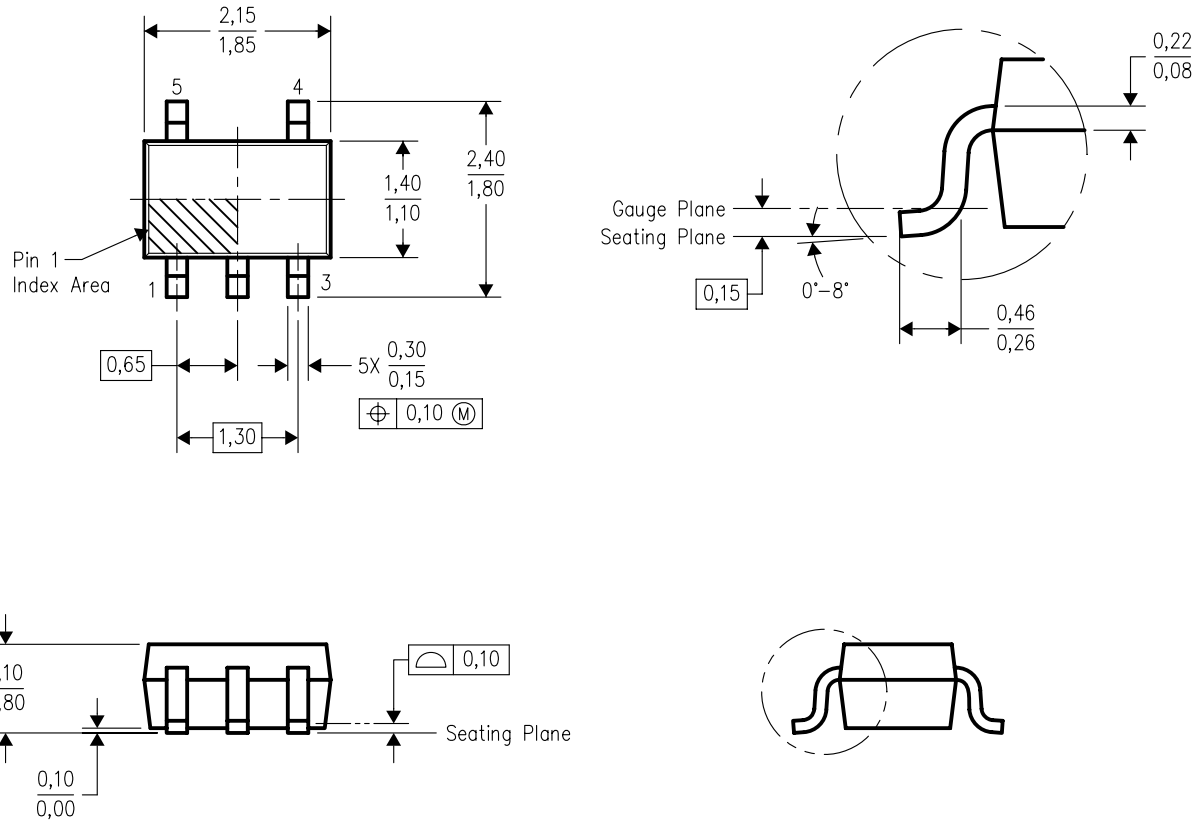
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LMS33460MG	SC70	DCK	5	1000	210.0	185.0	35.0
LMS33460MG/NOPB	SC70	DCK	5	1000	210.0	185.0	35.0

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



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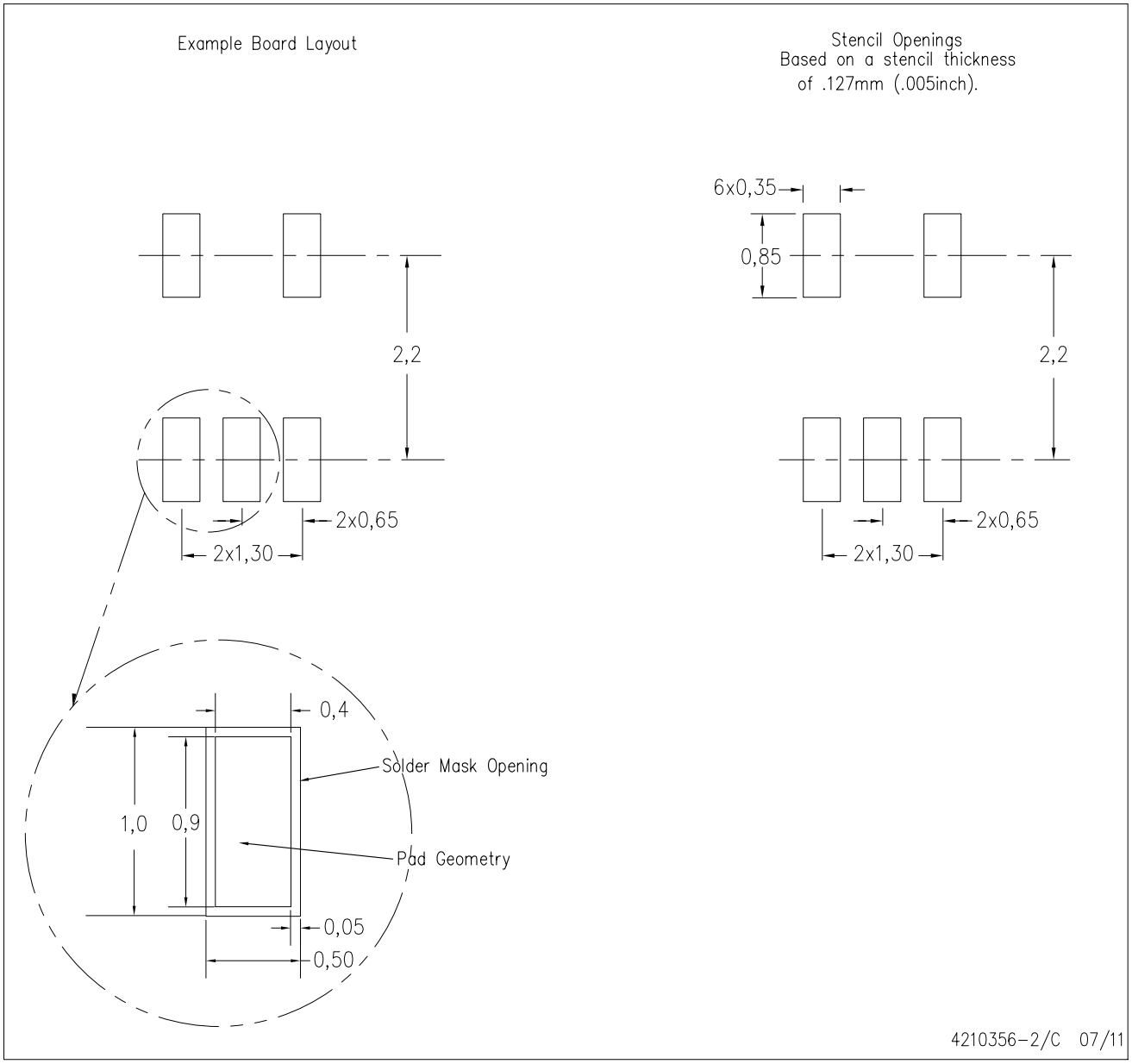
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
D. Falls within JEDEC MO–203 variation AA.

DCK (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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