



## Product Change Notification / SYST-05RLJS516

---

**Date:**

20-May-2022

**Product Category:**

Power Management - System Supervisors/Voltage Detectors

**PCN Type:**

Document Change

**Notification Subject:**

Data Sheet - MIC811/812 Data Sheet

**Affected CPNs:**

[SYST-05RLJS516\\_Affected\\_CPN\\_05202022.pdf](#)

[SYST-05RLJS516\\_Affected\\_CPN\\_05202022.csv](#)

**Notification Text:**

SYST-05RLJS516

Microchip has released a new Product Documents for the MIC811/812 Data Sheet of devices. If you are using one of these devices please read the document located at [MIC811/812 Data Sheet](#).

**Notification Status:** Final

**Description of Change:**

- Converted Micrel document MIC811/MIC812 to Microchip data sheet template DS20006526A.
- Minor grammatical text changes throughout.

**Impacts to Data Sheet:** None

**Reason for Change:** To Improve Manufacturability

**Change Implementation Status:** Complete

**Date Document Changes Effective:** 6 May 2022

**Revision History:** May 20 2022: Updated affected parts list.

**NOTE:** Please be advised that this is a change to the document only the product has not been changed.

**Markings to Distinguish Revised from Unrevised Devices:** N/A

Please contact your local [Microchip sales office](#) with questions or concerns regarding this notification.

**Terms and Conditions:**

If you wish to receive Microchip PCNs via email please register for our PCN email service at our [PCN home page](#) select register then fill in the required fields. You will find instructions about registering for Microchips PCN email service in the [PCN FAQ](#) section.

If you wish to change your PCN profile, including opt out, please go to the [PCN home page](#) select login and sign into your myMicrochip account. Select a profile option from the left navigation bar and make the applicable selections.

Affected Catalog Part Numbers (CPN)

MIC811JUY-TR  
MIC811LUY-TR  
MIC811MUY-TR  
MIC811RUY-TR  
MIC811SUY-TR  
MIC811TUY-TR  
MIC812JUY-TR  
MIC812LUY-TR  
MIC812MUY-TR  
MIC812RUY-TR  
MIC812SUY-TR  
MIC812TUY-TR



## Product Change Notification / SYST-05RLJS516

---

### Date:

06-May-2022

### Product Category:

Power Management - System Supervisors/Voltage Detectors

### PCN Type:

Document Change

### Notification Subject:

Data Sheet - MIC811/812 Data Sheet

### Affected CPNs:

[SYST-05RLJS516\\_Affected\\_CPN\\_05062022.pdf](#)

[SYST-05RLJS516\\_Affected\\_CPN\\_05062022.csv](#)

### Notification Text:

SYST-05RLJS516

Microchip has released a new Product Documents for the MIC811/812 Data Sheet of devices. If you are using one of these devices please read the document located at [MIC811/812 Data Sheet](#).

**Notification Status:** Final

#### Description of Change:

- Converted Micrel document MIC811/MIC812 to Microchip data sheet template DS20006526A.
- Minor grammatical text changes throughout.

**Impacts to Data Sheet:** None

**Reason for Change:** To Improve Manufacturability

**Change Implementation Status:** Complete

**Date Document Changes Effective:** 6 May 2022

**NOTE:** Please be advised that this is a change to the document only the product has not been changed.

**Markings to Distinguish Revised from Unrevised Devices:** N/A

## **Attachments:**

[MIC811/812 Data Sheet](#)

Please contact your local [Microchip sales office](#) with questions or concerns regarding this notification.

## **Terms and Conditions:**

If you wish to receive Microchip PCNs via email please register for our PCN email service at our [PCN home page](#) select register then fill in the required fields. You will find instructions about registering for Microchips PCN email service in the [PCN FAQ](#) section.

If you wish to change your PCN profile, including opt out, please go to the [PCN home page](#) select login and sign into your myMicrochip account. Select a profile option from the left navigation bar and make the applicable selections.

Affected Catalog Part Numbers (CPN)

MIC8114TUY-TR

MIC8115TUY-TR

MIC811JUY-TR

MIC811LUY-TR

MIC811MUY-TR

MIC811RUY-TR

MIC811SUY-TR

MIC811TUY-TR

MIC812JUY-TR

MIC812LUY-TR

MIC812MUY-TR

MIC812RUY-TR

MIC812SUY-TR

MIC812TUY-TR

## Microprocessor Reset Circuits

### Features

- Precision Voltage Monitor for 3V, 3.3V, or 5V Power Supplies
- /RESET Remains Valid with  $V_{CC}$  as Low as 1V
- 5  $\mu$ A Typical Supply Current
- 140 ms Minimum Reset Pulse Width Available
- Manual Reset Input
- Available in 4-Lead SOT-143 Package

### Applications

- Portable Equipment
- Intelligent Instruments
- Critical Microprocessor Power Monitoring
- Printers/Computers
- Controllers

### General Description

The MIC811 and MIC812 are inexpensive microprocessor supervisory circuits that monitor power supplies in microprocessor based systems.

The function of this device is to assert a reset if either the power supply drops below a designated reset threshold level or /MR is forced low. Several different reset threshold levels are available to accommodate 3V, 3.3V, or 5V powered systems.

The MIC811 has an active-low /RESET output, while the MIC812 offers an active-high RESET output. The reset output remains asserted for a minimum of 140 ms after  $V_{CC}$  has risen above the designed reset threshold level. Having a push-pull output stage, the MIC811/812 do not require a pull-up resistor at the output. The MIC811 and MIC812 come in a 4-lead SOT-143 package.

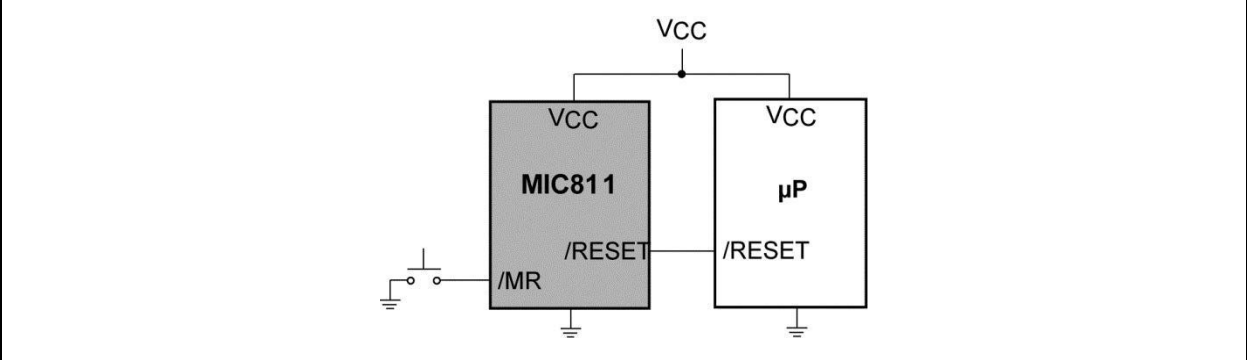
If a microprocessor voltage supervisor with an open-drain output stage is needed, see MIC6315.

### Package Types

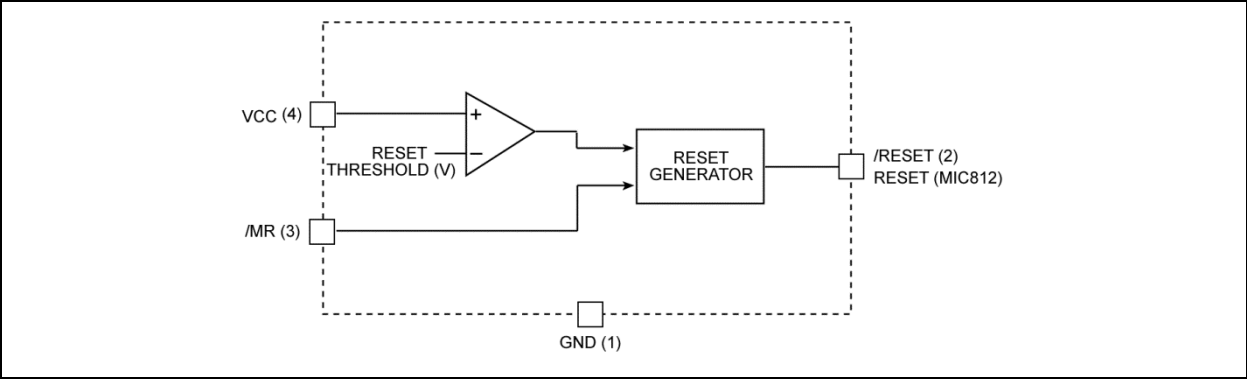


# MIC811/MIC812

## Typical Application Circuit



## Functional Block Diagram





## 1.0 ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings †

Terminal Voltage (VCC).....	-0.3V to +6.0V
Input Current (VCC, /MR).....	20 mA
Output Current (/RESET, RESET).....	20 mA
Rate of Rise (VCC).....	100V/μs
ESD Rating (Note 1).....	3 kV

### Operating Ratings ‡

Power Dissipation (T <sub>A</sub> = +70°C).....	320 mW
---	--------

† **Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

‡ **Notice:** The device is not guaranteed to function outside its operating rating.

**Note 1:** Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5 kΩ in series with 100 pF.

## ELECTRICAL CHARACTERISTICS

**Electrical Characteristics:** For typical values, V<sub>CC</sub> = 5V for MIC81\_L/M/J, V<sub>CC</sub> = 3.3V for MIC81\_S/T, V<sub>CC</sub> = 3V for MIC81\_R; T<sub>A</sub> = +25°C, bold values indicate -40°C to ≤ T<sub>A</sub> ≤ +85°C; unless noted. (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Operating Voltage Range	V <sub>CC</sub>	<b>1</b>	—	<b>5.5</b>	V	T <sub>A</sub> = -40°C to +85°C
Supply Current	I <sub>VCC</sub>	—	5	<b>15</b>	μA	MIC811L/M/J, MIC812L/M/J: V <sub>CC</sub> = 5.0V, no load
		—	5	<b>10</b>		MIC811S/T, MIC812S/T: V <sub>CC</sub> = 3.3V, no load
		—	5	<b>10</b>		MIC811R, MIC812R: V <sub>CC</sub> = 3.0V, no load
Reset Voltage Threshold	V <sub>TH</sub>	<b>4.50</b>	4.63	<b>4.75</b>	V	MIC811L, MIC812L
		<b>4.25</b>	4.38	<b>4.50</b>		MIC811M, MIC812M
		<b>3.89</b>	4.00	<b>4.10</b>		MIC811J, MIC812J
		<b>3.00</b>	3.08	<b>3.15</b>		MIC811T, MIC812T
		<b>2.85</b>	2.93	<b>3.00</b>		MIC811S, MIC812S
		<b>2.55</b>	2.63	<b>2.70</b>		MIC811R, MIC812R
Reset Timeout Period	t <sub>RST</sub>	<b>140</b>	240	<b>560</b>	ms	—
/RESET Output Voltage	V <sub>OH</sub>	<b>V<sub>CC</sub> - 1.5V</b>	—	—	V	I <sub>SOURCE</sub> = 800 μA, MIC811L/M/J
		<b>0.8 x V<sub>CC</sub></b>	—	—		I <sub>SOURCE</sub> = 500 μA, MIC811R/S/T

**Note 1:** Specification for packaged product only.

# MIC811/MIC812

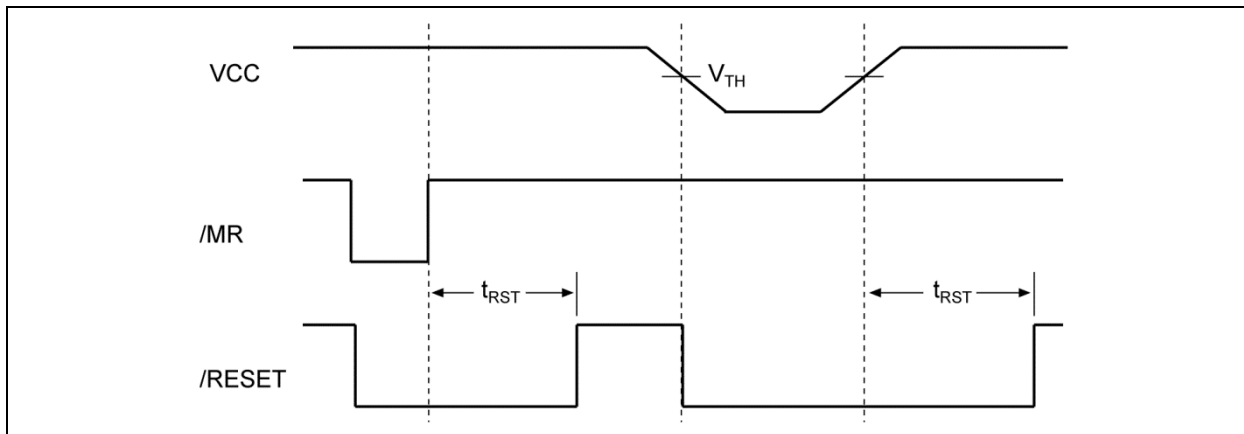
## ELECTRICAL CHARACTERISTICS (CONTINUED)

**Electrical Characteristics:** For typical values,  $V_{CC} = 5V$  for MIC81\_L/M/J,  $V_{CC} = 3.3V$  for MIC81\_S/T,  $V_{CC} = 3V$  for MIC81\_R;  $T_A = +25^\circ C$ , bold values indicate  $-40^\circ C \leq T_A \leq +85^\circ C$ ; unless noted. (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
/RESET Output Voltage	$V_{OL}$	—	—	<b>0.4</b>	V	$V_{CC} = V_{TH \text{ min.}}$ , $I_{SINK} = 3.2 \text{ mA}$ , MIC811L/M/J
		—	—	<b>0.3</b>		$V_{CC} = V_{TH \text{ min.}}$ , $I_{SINK} = 1.2 \text{ mA}$ , MIC811R/S/T
		—	—	<b>0.3</b>		$V_{CC} > 1V$ , $I_{SINK} = 50 \mu A$ , $T_A = -40^\circ C$ to $+85^\circ C$
RESET Output Voltage	$V_{OH}$	<b><math>0.8 \times V_{CC}</math></b>	—	—	V	$1.8V < V_{CC} < V_{TH \text{ min.}}$ , $I_{SOURCE} = 150 \mu A$
RESET Output Voltage	$V_{OL}$	—	—	<b>0.4</b>	V	$I_{SINK} = 3.2 \text{ mA}$ , MIC812L/M/J
		—	—	<b>0.3</b>		$I_{SINK} = 1.2 \text{ mA}$ , MIC812R/S/T
/MR Minimum Pulse Width	—	<b>10</b>	—	—	$\mu s$	—
/MR to Reset Delay	—	—	0.5	—	$\mu s$	—
/MR Input Threshold	$V_{IH}$	<b>2.3</b>	—	—	V	$V_{CC} > V_{TH \text{ max.}}$ , MIC81_L/M/J
		<b><math>0.7 \times V_{CC}</math></b>	—	—		MIC81_R/S/T
/MR Input Threshold	$V_{IL}$	—	—	<b>0.8</b>	V	$V_{CC} > V_{TH \text{ max.}}$ , MIC81_L/M/J
		—	—	<b><math>0.25 \times V_{CC}</math></b>		MIC81_R/S/T
/MR Pull-Up Resistance	—	<b>10</b>	20	<b>30</b>	$k\Omega$	—
/MR Glitch Immunity	—	—	100	—	ns	—

**Note 1:** Specification for packaged product only.

### Reset Timing Diagram



## TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
<b>Temperature Ranges</b>						
Operating Temperature Range	$T_A$	-40	—	+85	°C	—
Storage Temperature Range	$T_S$	+5	—	+150	°C	—
Lead Temperature	—	—	—	+300	°C	Soldering, 10 sec.
<b>Package Thermal Resistance</b>						
Thermal Resistance, SOT-143, 4-Ld	$\theta_{JA}$	—	265	—	°C/W	—

**Note 1:** The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e.,  $T_A$ ,  $T_J$ ,  $\theta_{JA}$ ). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +85°C rating. Sustained junction temperatures above +85°C can impact the device reliability.

# MIC811/MIC812

---

## 2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 2-1](#).

**TABLE 2-1: PIN FUNCTION TABLE**

Pin Number MIC811	Pin Number MIC812	Pin Name	Description
1	1	GND	IC Ground Pin.
2	N/A	/RESET	/RESET goes low if $V_{CC}$ falls below the reset threshold and remains asserted for one reset timeout period (140 ms min.) after $V_{CC}$ exceeds the reset threshold.
N/A	2	RESET	RESET goes high if $V_{CC}$ falls below the reset threshold and remains asserted for one reset timeout period (140 ms min.) after $V_{CC}$ exceeds the reset threshold.
3	3	/MR	Manual Reset Input. A logic low on /MR will force a reset. The reset will remain asserted as long as /MR is held low and for one reset timeout period (140 ms min.) after /MR goes high. This input can be shorted to ground via a switch or driven from CMOS or TTL logic. Float if unused.
4	4	VCC	Power Supply Input.

## 3.0 APPLICATION INFORMATION

### 3.1 Microprocessor Reset

The /RESET (or RESET) pin is asserted whenever  $V_{CC}$  falls below the reset threshold voltage. The /RESET pin remains asserted for a period of 140 ms after  $V_{CC}$  has risen above the reset threshold voltage. The reset function ensures that the microprocessor is properly reset and powers up in a known condition after a power failure. /RESET will remain valid with  $V_{CC}$  as low as 1V.

### 3.2 VCC Transients

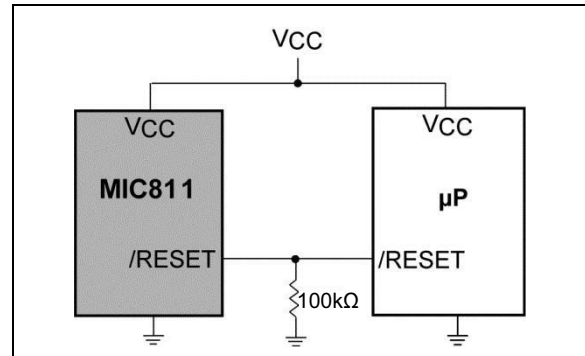
The MIC811/812 are relatively immune to negative-going  $V_{CC}$  glitches below the reset threshold. Typically, a negative-going transient 125 mV below the reset threshold with a duration of 20  $\mu$ s or less will not cause a reset.

### 3.3 Interfacing to Bidirectional Reset Pins

The MIC811/812 can interface with microprocessors with bidirectional reset pins by connecting a 4.7 k $\Omega$  resistor in series with the MIC811/812 output and the microprocessor reset pin.

### 3.4 /RESET Valid at Low Voltage

A resistor can be added from the /RESET pin to ground to ensure the /RESET output remains low with  $V_{CC}$  down to 0V. A 100 k $\Omega$  resistor connected from the /RESET to ground is recommended. The value of the resistor should be large enough not to load the output excessively and small enough to pull-down any stray leakage currents.



**FIGURE 3-1:** Reset Valid to  $V_{CC} = 0V$ .

# MIC811/MIC812

## 4.0 PACKAGING INFORMATION

### 4.1 Package Marking Information

4-Lead SOT-143\*  
(Front)

XX

Example

KM

4-Lead SOT-143\*  
(Back)

MNNN

Example

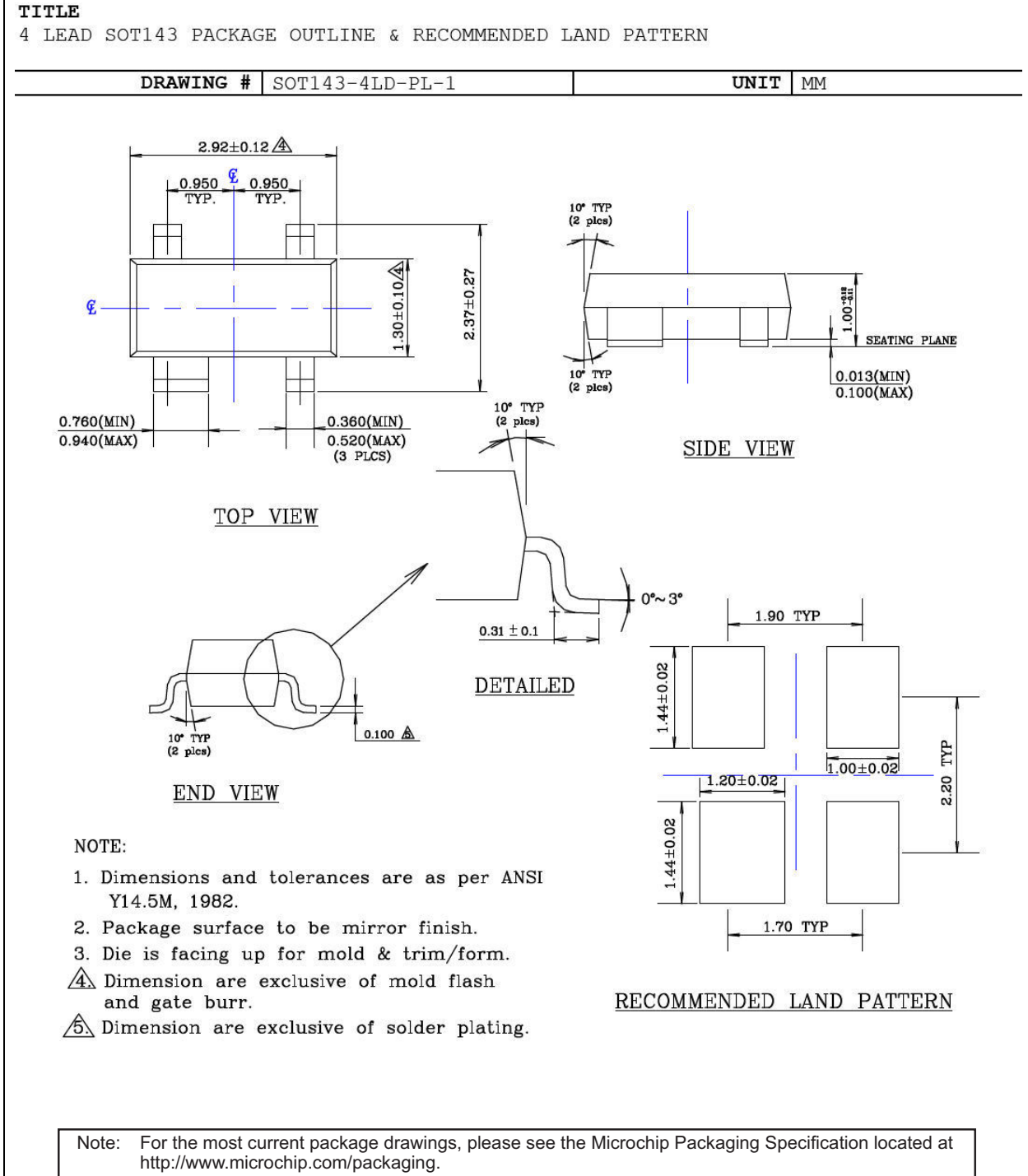
95H4

<b>Legend:</b>	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.
	•, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).
<b>Note:</b>	In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.	
	Underbar ( <u> </u> ) and/or Overbar ( $\bar{ $ ) symbol may not be to scale.	

TABLE 4-1: MARKING CODES

Part Number	Marking Code	Threshold Voltage
MIC811LUY	<u>KL</u>	4.63V
MIC811MUJ	<u>KM</u>	4.38V
MIC811JUY	<u>KJ</u>	4.00V
MIC811TUY	<u>KI</u>	3.08V
MIC811SUJ	<u>KS</u>	2.93V
MIC811RUJ	<u>KR</u>	2.63V
MIC812LUY	<u>LL</u>	4.63V
MIC812MUJ	<u>LM</u>	4.38V
MIC812JUY	<u>LJ</u>	4.00V
MIC812TUY	<u>LI</u>	3.08V
MIC812SUJ	<u>LS</u>	2.93V
MIC812RUJ	<u>LR</u>	2.63V

## 4-Lead SOT-143 Package Outline and Recommended Land Pattern



# MIC811/MIC812

---

NOTES:



## APPENDIX A: REVISION HISTORY

### Revision A (May 2022)

- Converted Micrel document MIC811/MIC812 to Microchip data sheet template DS20006526A.
- Minor grammatical text changes throughout.

# MIC811/MIC812

---

---

NOTES:

## PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

<u>Device</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>-XX</u>	
Part No.	Threshold Voltage	Package	Temp. Range	Media Type	
<b>Device:</b>	MIC811:	Microprocessor Reset Circuits with Active-Low /RESET			
	MIC812:	Microprocessor Reset Circuits with Active-High RESET			
<b>Threshold Voltage:</b>	R =	2.63V			
	S =	2.93V			
	T =	3.08V			
	J =	4.00V			
	M =	4.38V			
	L =	4.63V			
<b>Package:</b>	U =	4-Lead SOT-143			
<b>Temperature Range:</b>	Y =	-40°C to +85°C			
<b>Media Type:</b>	TR =	3,000/Reel			
					<b>Examples:</b>
					a) MIC811RUY-TR: MIC811, 2.63V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					b) MIC811JUY-TR: MIC811, 4.00V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					c) MIC811TUY-TR: MIC811, 3.08V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					d) MIC812SUY-TR: MIC812, 2.93V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					e) MIC812LUY-TR: MIC812, 4.63V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					f) MIC812MUY-TR: MIC812, 4.38V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					<b>Note 1:</b> Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

# MIC811/MIC812

---

---

NOTES:

---

---

**Note the following details of the code protection feature on Microchip products:**

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
- Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip product is strictly prohibited and may violate the Digital Millennium Copyright Act.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is “unbreakable”. Code protection is constantly evolving. Microchip is committed to continuously improving the code protection features of our products.

---

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. Contact your local Microchip sales office for additional support or, obtain additional support at <https://www.microchip.com/en-us/support/design-help/client-support-services>.

THIS INFORMATION IS PROVIDED BY MICROCHIP "AS IS". MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL LOSS, DAMAGE, COST, OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP'S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION.

Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

For information regarding Microchip's Quality Management Systems, please visit [www.microchip.com/quality](http://www.microchip.com/quality).

**Trademarks**

The Microchip name and logo, the Microchip logo, Adaptec, AnyRate, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, CryptoMemory, CryptoRF, dsPIC, flexPWR, HELDO, IGLOO, JukeBlox, KeeLoq, Kleer, LANCheck, LinkMD, maXStylus, maXTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

AgileSwitch, APT, ClockWorks, The Embedded Control Solutions Company, EtherSynch, Flashtec, Hyper Speed Control, HyperLight Load, IntelliMOS, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, QuietWire, SmartFusion, SyncWorld, Temux, TimeCesium, TimeHub, TimePictra, TimeProvider, TrueTime, WinPath, and ZL are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, Augmented Switching, BlueSky, BodyCom, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, Espresso T1S, EtherGREEN, GridTime, IdealBridge, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, Inter-Chip Connectivity, JitterBlocker, Knob-on-Display, maxCrypto, maxView, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, NVM Express, NVMe, Omniscient Code Generation, PICDEM, PICDEM.net, PICKit, PICtail, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, RTAX, RTG4, SAM-ICE, Serial Quad I/O, simpleMAP, SimpliPHY, SmartBuffer, SmartHLS, SMART-I.S., storClad, SQL, SuperSwitcher, SuperSwitcher II, Switchtec, SynchroPHY, Total Endurance, TSHARC, USBCheck, VariSense, VectorBlox, VeriPHY, ViewSpan, WiperLock, XpressConnect, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

The Adaptec logo, Frequency on Demand, Silicon Storage Technology, Symmcom, and Trusted Time are registered trademarks of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2022, Microchip Technology Incorporated and its subsidiaries.

All Rights Reserved.

ISBN: 978-1-6683-0390-0



# MICROCHIP

## Worldwide Sales and Service

### AMERICAS

**Corporate Office**  
2355 West Chandler Blvd.  
Chandler, AZ 85224-6199  
Tel: 480-792-7200  
Fax: 480-792-7277  
Technical Support:  
[http://www.microchip.com/  
support](http://www.microchip.com/support)  
Web Address:  
[www.microchip.com](http://www.microchip.com)

**Atlanta**  
Duluth, GA  
Tel: 678-957-9614  
Fax: 678-957-1455

**Austin, TX**  
Tel: 512-257-3370

**Boston**  
Westborough, MA  
Tel: 774-760-0087  
Fax: 774-760-0088

**Chicago**  
Itasca, IL  
Tel: 630-285-0071  
Fax: 630-285-0075

**Dallas**  
Addison, TX  
Tel: 972-818-7423  
Fax: 972-818-2924

**Detroit**  
Novi, MI  
Tel: 248-848-4000

**Houston, TX**  
Tel: 281-894-5983

**Indianapolis**  
Noblesville, IN  
Tel: 317-773-8323  
Fax: 317-773-5453  
Tel: 317-536-2380

**Los Angeles**  
Mission Viejo, CA  
Tel: 949-462-9523  
Fax: 949-462-9608  
Tel: 951-273-7800

**Raleigh, NC**  
Tel: 919-844-7510

**New York, NY**  
Tel: 631-435-6000

**San Jose, CA**  
Tel: 408-735-9110  
Tel: 408-436-4270

**Canada - Toronto**  
Tel: 905-695-1980  
Fax: 905-695-2078

### ASIA/PACIFIC

**Australia - Sydney**  
Tel: 61-2-9868-6733

**China - Beijing**  
Tel: 86-10-8569-7000

**China - Chengdu**  
Tel: 86-28-8665-5511

**China - Chongqing**  
Tel: 86-23-8980-9588

**China - Dongguan**  
Tel: 86-769-8702-9880

**China - Guangzhou**  
Tel: 86-20-8755-8029

**China - Hangzhou**  
Tel: 86-571-8792-8115

**China - Hong Kong SAR**  
Tel: 852-2943-5100

**China - Nanjing**  
Tel: 86-25-8473-2460

**China - Qingdao**  
Tel: 86-532-8502-7355

**China - Shanghai**  
Tel: 86-21-3326-8000

**China - Shenyang**  
Tel: 86-24-2334-2829

**China - Shenzhen**  
Tel: 86-755-8864-2200

**China - Suzhou**  
Tel: 86-186-6233-1526

**China - Wuhan**  
Tel: 86-27-5980-5300

**China - Xian**  
Tel: 86-29-8833-7252

**China - Xiamen**  
Tel: 86-592-2388138

**China - Zhuhai**  
Tel: 86-756-3210040

### ASIA/PACIFIC

**India - Bangalore**  
Tel: 91-80-3090-4444

**India - New Delhi**  
Tel: 91-11-4160-8631

**India - Pune**  
Tel: 91-20-4121-0141

**Japan - Osaka**  
Tel: 81-6-6152-7160

**Japan - Tokyo**  
Tel: 81-3-6880-3770

**Korea - Daegu**  
Tel: 82-53-744-4301

**Korea - Seoul**  
Tel: 82-2-554-7200

**Malaysia - Kuala Lumpur**  
Tel: 60-3-7651-7906

**Malaysia - Penang**  
Tel: 60-4-227-8870

**Philippines - Manila**  
Tel: 63-2-634-9065

**Singapore**  
Tel: 65-6334-8870

**Taiwan - Hsin Chu**  
Tel: 886-3-577-8366

**Taiwan - Kaohsiung**  
Tel: 886-7-213-7830

**Taiwan - Taipei**  
Tel: 886-2-2508-8600

**Thailand - Bangkok**  
Tel: 66-2-694-1351

**Vietnam - Ho Chi Minh**  
Tel: 84-28-5448-2100

### EUROPE

**Austria - Wels**  
Tel: 43-7242-2244-39  
Fax: 43-7242-2244-393

**Denmark - Copenhagen**  
Tel: 45-4485-5910  
Fax: 45-4485-2829

**Finland - Espoo**  
Tel: 358-9-4520-820

**France - Paris**  
Tel: 33-1-69-53-63-20  
Fax: 33-1-69-30-90-79

**Germany - Garching**  
Tel: 49-8931-9700

**Germany - Haan**  
Tel: 49-2129-3766400

**Germany - Heilbronn**  
Tel: 49-7131-72400

**Germany - Karlsruhe**  
Tel: 49-721-625370

**Germany - Munich**  
Tel: 49-89-627-144-0  
Fax: 49-89-627-144-44

**Germany - Rosenheim**  
Tel: 49-8031-354-560

**Israel - Ra'anana**  
Tel: 972-9-744-7705

**Italy - Milan**  
Tel: 39-0331-742611  
Fax: 39-0331-466781

**Italy - Padova**  
Tel: 39-049-7625286

**Netherlands - Drunen**  
Tel: 31-416-690399  
Fax: 31-416-690340

**Norway - Trondheim**  
Tel: 47-7288-4388

**Poland - Warsaw**  
Tel: 48-22-3325737

**Romania - Bucharest**  
Tel: 40-21-407-87-50

**Spain - Madrid**  
Tel: 34-91-708-08-90  
Fax: 34-91-708-08-91

**Sweden - Gothenberg**  
Tel: 46-31-704-60-40

**Sweden - Stockholm**  
Tel: 46-8-5090-4654

**UK - Wokingham**  
Tel: 44-118-921-5800  
Fax: 44-118-921-5820