

---

---

**28 V, 300 W, 175 MHz Dual RF Power MOSFET**

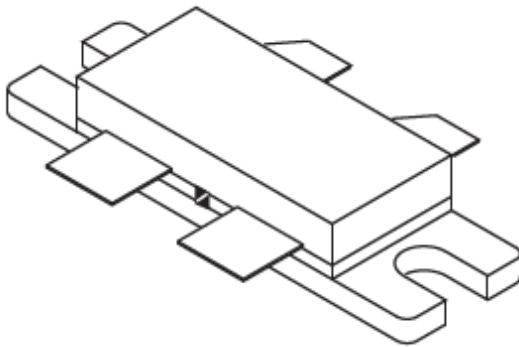
---

---

**Product Overview**

---

The VRF141G is designed for broadband commercial and military applications at frequencies to 175 MHz. The high power, high gain, and broadband performance of this device make possible solid state transmitters for FM broadcast or TV channel frequency bands.

**Features**

- Improved ruggedness  $V_{(BR)DSS} = 80\text{ V}$
- 300 W with 14 dB typical gain at 175 MHz, 28 V
- Excellent stability and low IMD
- Common source push-pull configuration
- 5:1 load VSWR capability at specified operating conditions
- Nitride passivated
- Refractory gold metallization
- High voltage replacement for MRF141G
- RoHS compliant

## 1. Device Specifications

This section shows the specifications of the VRF141G device.

### 1.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the VRF141G device.  $T_C = 25\text{ }^\circ\text{C}$  unless otherwise specified.

**Table 1-1. Absolute Maximum Ratings**

Symbol	Parameter	Ratings	Unit
$V_{DSS}$	Drain source voltage	80	V
$I_D$	Continuous drain current	40	A
$V_{GS}$	Gate-source voltage	$\pm 40$	V
$P_D$	Total power dissipation	500	W
$T_{STG}$	Storage temperature range	$-65$ to $150$	$^\circ\text{C}$
$T_J$	Operating junction temperature	200	

### 1.2 Electrical Performance

The following table shows the static characteristics of the VRF141G device.  $T_C = 25\text{ }^\circ\text{C}$  unless otherwise specified.

**Table 1-2. Static Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ , $I_D = 100\text{ mA}$	80	90		V
$V_{DS(ON)}$	On-state drain voltage	$I_{D(ON)} = 10\text{ A}$ , $V_{GS} = 10\text{ V}$		1.0	1.4	
$I_{DSS}$	Zero gate voltage drain current	$V_{DS} = 60\text{ V}$ , $V_{GS} = 0\text{ V}$			1.0	mA
$I_{GSS}$	Gate-source leakage current	$V_{DS} = \pm 20\text{ V}$ , $V_{GS} = 0\text{ V}$			1.0	$\mu\text{A}$
$g_{fs}$	Forward transconductance	$V_{DS} = 10\text{ V}$ , $I_D = 5\text{ A}$	5.0			mhos
$V_{GS(th)}$	Gate-source threshold voltage	$V_{DS} = 10\text{ V}$ , $I_D = 100\text{ mA}$	2.9	3.6	4.4	V

The following table shows the thermal characteristics of the VRF141G device.

**Table 1-3. Thermal Characteristics**

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance			0.35	$^\circ\text{C/W}$

**Note:** These devices are sensitive to electrostatic discharge. Proper handling procedures should be followed.

The following table shows the dynamic characteristics of the VRF141G device.  $T_C = 25\text{ }^\circ\text{C}$  unless otherwise specified.

**Table 1-4. Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 28\text{ V}, f = 1\text{ MHz}$		400		pF
$C_{oss}$	Output capacitance			375		
$C_{rss}$	Reverse transfer capacitance			50		

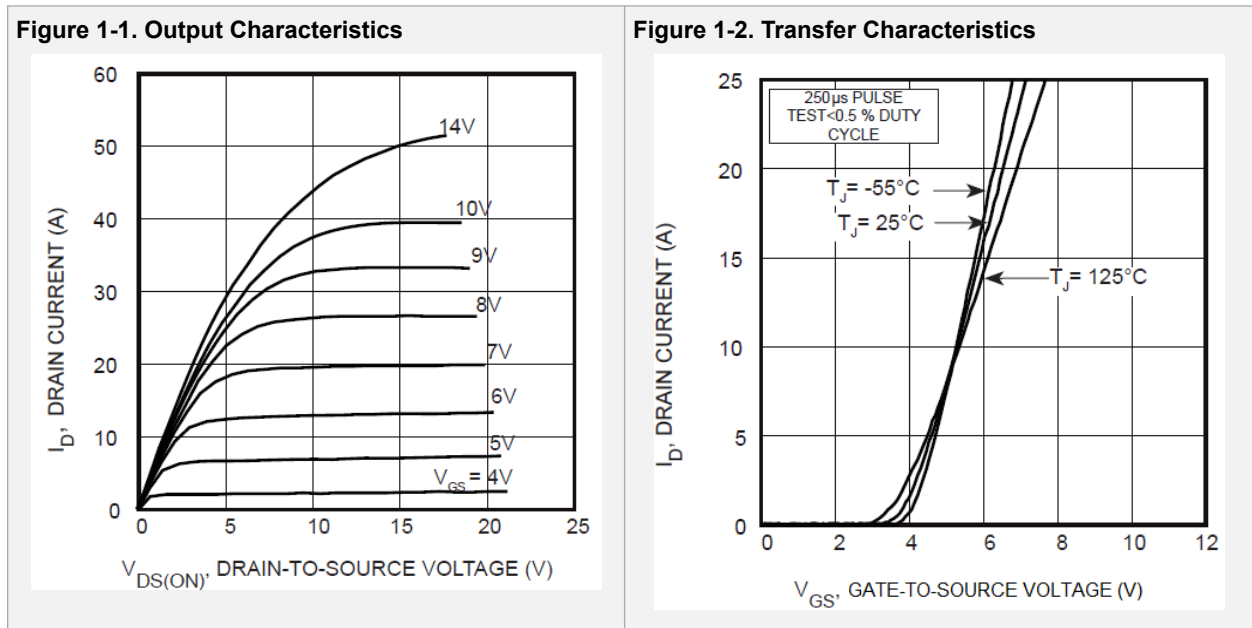
The following table shows the functional characteristics of the VRF141G device.  $T_C = 25\text{ }^\circ\text{C}$  unless otherwise specified.

**Table 1-5. Functional Characteristics**

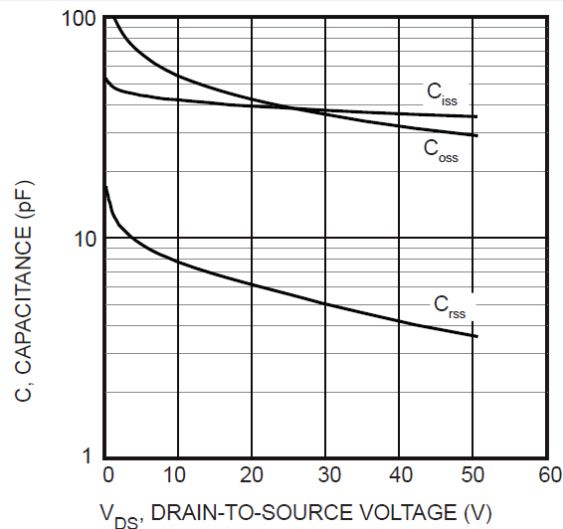
Symbol	Test Conditions	Min	Typ	Max	Unit
$G_{PS}$	$f_1 = 175\text{ MHz}, V_{DD} = 28\text{ V}, I_{DQ} = 500\text{ mA}, P_{out} = 300\text{ W}$	12	14		dB
$\eta_D$	$f_1 = 175\text{ MHz}, V_{DD} = 28\text{ V}, I_{DQ} = 500\text{ mA}, P_{out} = 300\text{ W}$	45	55		%
$\Psi$	$f_1 = 175\text{ MHz}, V_{DD} = 28\text{ V}, I_{DQ} = 500\text{ mA}, P_{out} = 300\text{ W}$ 5:1 VSWR — all phase angles	No degradation in output power			

### 1.3 Typical Performance Curves

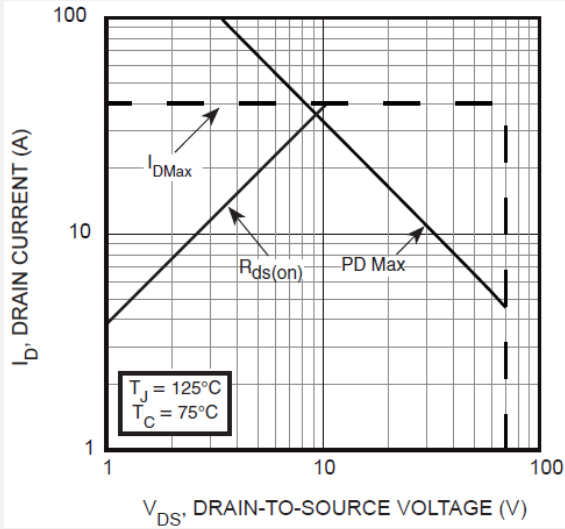
This section shows the typical performance curves of the VRF141G device.



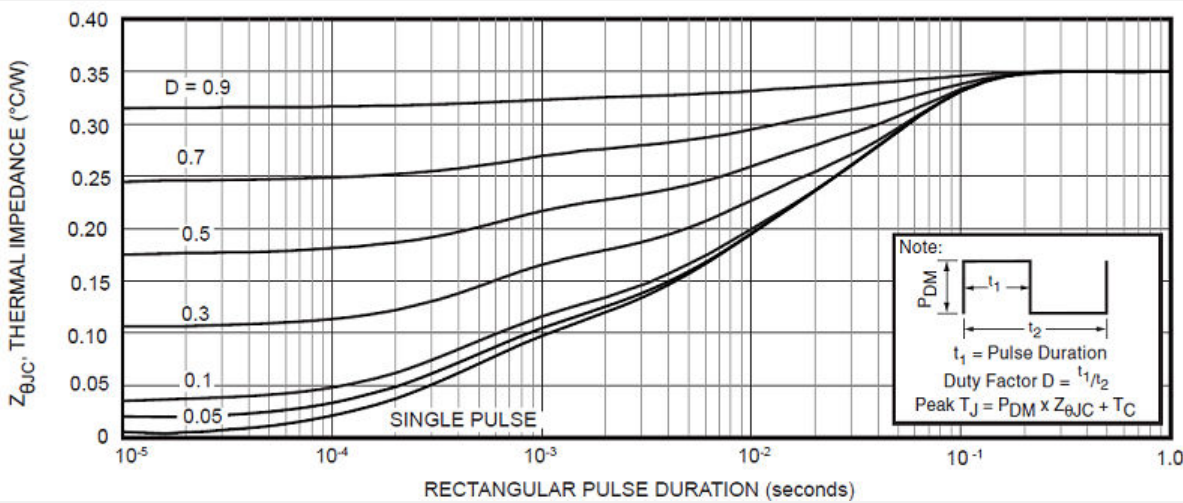
**Figure 1-3. Capacitance vs. Drain-to-Source Voltage**



**Figure 1-4. Forward Safe Operating Area**



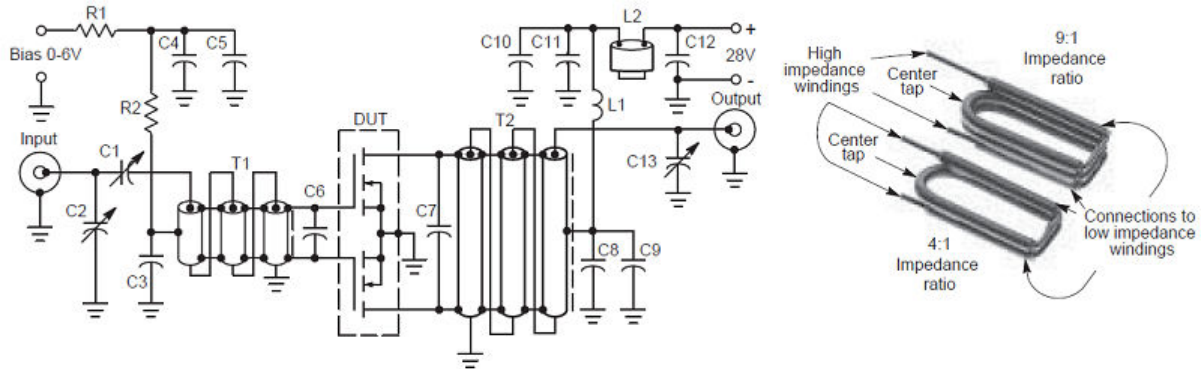
**Figure 1-5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs. Pulse Duration**



## 2. Test Circuits

The following figure shows the test circuits of the VRF141G device.

Figure 2-1. 30 MHz Test Circuit



C1 - Arco 402, 1.5  $\pm$ 20 pF  
 C2 - Arco 406, 15  $\pm$ 115 pF  
 C3, C4, C8, C9, C10 - 1000 pF Chip  
 C5, C11 - 0.1 nF Chip  
 C6 - 330 pF Chip  
 C7 - 200 pF and 180 pF Chips in Parallel  
 C12 - 0.47 nF Ceramic Chip, Kemet 1215 or Equivalent  
 C13 - Arco 403, 3.0  $\pm$ 35 pF  
 L1 - 10 Turns AWG #16 Enameled Wire,  
 Close Wound, 1/4, I.D.  
 L2 - Ferrite Beads of Suitable Material for  
 1.5 $\pm$ 2.0 nH Total Inductance  
 R1 - 100 Ohms, 1/2 W  
 R2 - 1.0 kOhm, 1/2 W

T1 - 9:1 RF Transformer. Can be made of 15 $\pm$ 18 Ohms  
 Semirigid Co-ax, 62  $\pm$ 90 Mils O.D.  
 T2 - 1:9 RF Transformer . Can be made of 15 $\pm$ 18 Ohms  
 Semirigid Co-ax, 70  $\pm$ 90 Mils O.D.

Board Material - 0.062", Fiberglass (G10),  
 1 oz. Copper Clad, 2 Sides,  $\epsilon_r = 5$

NOTE: For stability, the input transformer T1 must be loaded  
 with ferrite toroids or beads to increase the common  
 mode inductance. For operation below 100 MHz. The  
 same is required for the output transformer.  
 See pictures for construction details.

Unless Otherwise Noted, All Chip Capacitors are ATC  
 Type 100B or Equivalent.

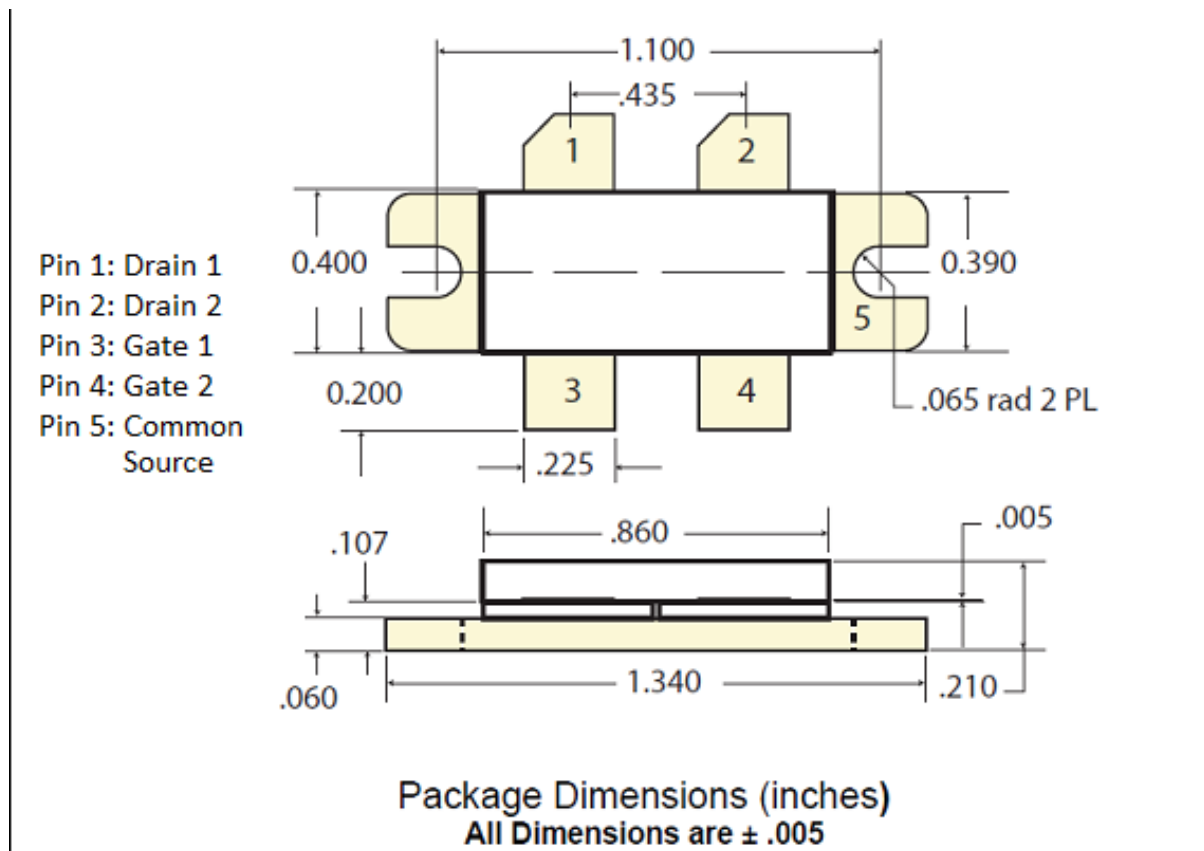
### 3. Package Specification

This section shows the package specification of the VRF141G device.

#### 3.1 Package Outline Drawing

The following figure illustrates the package outline of the VRF141G device.

Figure 3-1. M208 Package Outline



**Note: Hazardous Material Warning!**

The ceramic portion of the device between leads and mounting flange is beryllium oxide. Beryllium oxide dust is highly toxic when inhaled. Care must be taken during handling and mounting to avoid damage to this area. These devices must never be thrown away with general industrial or domestic waste.

## 4. Revision History

Table 4-1. Revision History

Revision	Date	Description
A	12/2021	<ul style="list-style-type: none"><li>• Document migrated from Microsemi template to Microchip template; Assigned Microchip literature number DS-00004328A, which replaces the previous Microsemi literature number 050-4953.</li><li>• Increased <math>V_{DS(on)}</math> limit from 1.3V max. to 1.4V max.</li></ul>
Initial releases (Microsemi Revisions A and B)	06/2009 – 12/2020	Previous releases.

## The Microchip Website

---

Microchip provides online support via our website at [www.microchip.com/](http://www.microchip.com/). This website is used to make files and information easily available to customers. Some of the content available includes:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip design partner program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

## Product Change Notification Service

---

Microchip's product change notification service helps keep customers current on Microchip products. Subscribers will receive email notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, go to [www.microchip.com/pcn](http://www.microchip.com/pcn) and follow the registration instructions.

## Customer Support

---

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Embedded Solutions Engineer (ESE)
- Technical Support

Customers should contact their distributor, representative or ESE for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in this document.

Technical support is available through the website at: [www.microchip.com/support](http://www.microchip.com/support)

## Microchip Devices Code Protection Feature

---

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.

## Legal Notice

---

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 [www.microchip.com/en-us/support/design-help/client-support-services](http://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.

## 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, Klear, 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, Quiet- Wire, 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.

© 2021, Microchip Technology Incorporated and its subsidiaries. All Rights Reserved.

ISBN: 978-1-5224-9395-2

## Quality Management System

---

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

## Worldwide Sales and Service

AMERICAS	ASIA/PACIFIC	ASIA/PACIFIC	EUROPE
<p><b>Corporate Office</b> 2355 West Chandler Blvd. Chandler, AZ 85224-6199 Tel: 480-792-7200 Tel: 480-792-7277 Technical Support: <a href="http://www.microchip.com/support">www.microchip.com/support</a> Web Address: <a href="http://www.microchip.com">www.microchip.com</a></p> <p><b>Atlanta</b> Duluth, GA Tel: 678-957-9614 Fax: 678-957-1455</p> <p><b>Austin, TX</b> Tel: 512-257-3370</p> <p><b>Boston</b> Westborough, MA Tel: 774-760-0087 Fax: 774-760-0088</p> <p><b>Chicago</b> Itasca, IL Tel: 630-285-0071 Fax: 630-285-0075</p> <p><b>Dallas</b> Addison, TX Tel: 972-818-7423 Fax: 972-818-2924</p> <p><b>Detroit</b> Novi, MI Tel: 248-848-4000</p> <p><b>Houston, TX</b> Tel: 281-894-5983</p> <p><b>Indianapolis</b> Noblesville, IN Tel: 317-773-8323 Fax: 317-773-5453 Tel: 317-536-2380</p> <p><b>Los Angeles</b> Mission Viejo, CA Tel: 949-462-9523 Fax: 949-462-9608 Tel: 951-273-7800</p> <p><b>Raleigh, NC</b> Tel: 919-844-7510</p> <p><b>New York, NY</b> Tel: 631-435-6000</p> <p><b>San Jose, CA</b> Tel: 408-735-9110 Tel: 408-436-4270</p> <p><b>Canada - Toronto</b> Tel: 905-695-1980 Fax: 905-695-2078</p>	<p><b>Australia - Sydney</b> Tel: 61-2-9868-6733</p> <p><b>China - Beijing</b> Tel: 86-10-8569-7000</p> <p><b>China - Chengdu</b> Tel: 86-28-8665-5511</p> <p><b>China - Chongqing</b> Tel: 86-23-8980-9588</p> <p><b>China - Dongguan</b> Tel: 86-769-8702-9880</p> <p><b>China - Guangzhou</b> Tel: 86-20-8755-8029</p> <p><b>China - Hangzhou</b> Tel: 86-571-8792-8115</p> <p><b>China - Hong Kong SAR</b> Tel: 852-2943-5100</p> <p><b>China - Nanjing</b> Tel: 86-25-8473-2460</p> <p><b>China - Qingdao</b> Tel: 86-532-8502-7355</p> <p><b>China - Shanghai</b> Tel: 86-21-3326-8000</p> <p><b>China - Shenyang</b> Tel: 86-24-2334-2829</p> <p><b>China - Shenzhen</b> Tel: 86-755-8864-2200</p> <p><b>China - Suzhou</b> Tel: 86-186-6233-1526</p> <p><b>China - Wuhan</b> Tel: 86-27-5980-5300</p> <p><b>China - Xian</b> Tel: 86-29-8833-7252</p> <p><b>China - Xiamen</b> Tel: 86-592-2388138</p> <p><b>China - Zhuhai</b> Tel: 86-756-3210040</p>	<p><b>India - Bangalore</b> Tel: 91-80-3090-4444</p> <p><b>India - New Delhi</b> Tel: 91-11-4160-8631</p> <p><b>India - Pune</b> Tel: 91-20-4121-0141</p> <p><b>Japan - Osaka</b> Tel: 81-6-6152-7160</p> <p><b>Japan - Tokyo</b> Tel: 81-3-6880-3770</p> <p><b>Korea - Daegu</b> Tel: 82-53-744-4301</p> <p><b>Korea - Seoul</b> Tel: 82-2-554-7200</p> <p><b>Malaysia - Kuala Lumpur</b> Tel: 60-3-7651-7906</p> <p><b>Malaysia - Penang</b> Tel: 60-4-227-8870</p> <p><b>Philippines - Manila</b> Tel: 63-2-634-9065</p> <p><b>Singapore</b> Tel: 65-6334-8870</p> <p><b>Taiwan - Hsin Chu</b> Tel: 886-3-577-8366</p> <p><b>Taiwan - Kaohsiung</b> Tel: 886-7-213-7830</p> <p><b>Taiwan - Taipei</b> Tel: 886-2-2508-8600</p> <p><b>Thailand - Bangkok</b> Tel: 66-2-694-1351</p> <p><b>Vietnam - Ho Chi Minh</b> Tel: 84-28-5448-2100</p>	<p><b>Austria - Wels</b> Tel: 43-7242-2244-39 Fax: 43-7242-2244-393</p> <p><b>Denmark - Copenhagen</b> Tel: 45-4485-5910 Fax: 45-4485-2829</p> <p><b>Finland - Espoo</b> Tel: 358-9-4520-820</p> <p><b>France - Paris</b> Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79</p> <p><b>Germany - Garching</b> Tel: 49-8931-9700</p> <p><b>Germany - Haan</b> Tel: 49-2129-3766400</p> <p><b>Germany - Heilbronn</b> Tel: 49-7131-72400</p> <p><b>Germany - Karlsruhe</b> Tel: 49-721-625370</p> <p><b>Germany - Munich</b> Tel: 49-89-627-144-0 Fax: 49-89-627-144-44</p> <p><b>Germany - Rosenheim</b> Tel: 49-8031-354-560</p> <p><b>Israel - Ra'anana</b> Tel: 972-9-744-7705</p> <p><b>Italy - Milan</b> Tel: 39-0331-742611 Fax: 39-0331-466781</p> <p><b>Italy - Padova</b> Tel: 39-049-7625286</p> <p><b>Netherlands - Druen</b> Tel: 31-416-690399 Fax: 31-416-690340</p> <p><b>Norway - Trondheim</b> Tel: 47-72884388</p> <p><b>Poland - Warsaw</b> Tel: 48-22-3325737</p> <p><b>Romania - Bucharest</b> Tel: 40-21-407-87-50</p> <p><b>Spain - Madrid</b> Tel: 34-91-708-08-90 Fax: 34-91-708-08-91</p> <p><b>Sweden - Gothenberg</b> Tel: 46-31-704-60-40</p> <p><b>Sweden - Stockholm</b> Tel: 46-8-5090-4654</p> <p><b>UK - Wokingham</b> Tel: 44-118-921-5800 Fax: 44-118-921-5820</p>

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Microchip:](#)

[VRF141G](#)