THE AP7217D IS NOT RECOMMENDED FOR NEW DESIGNS.
PLEASE USE THE AP7361EA.

AP7217D

1.2V 600mA CMOS LDO

Lead-free Green

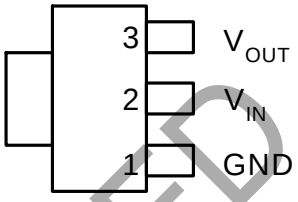
Description

The AP7217D low-dropout linear regulator operates from 2.5V to 5.5V supply and delivers a guaranteed 600mA continuous load current.

The space-saving SOT89-3L package is suitable for “pocket” and hand-held application.

Pin Assignments

(Top View)



Tab is V_{IN}

SOT89-3L

Features

- Low Current Consumption: Typ. 40μA
- Output Voltage: 1.2V
- Guaranteed 600mA Output Current
- Dropout Voltage 850mV at 600mA Output Current
- Input Voltage Range: 2.5V to 5.5V
- Current Limit Protection
- Thermal shutdown Protection
- Stability with Low ESR Capacitors
- Low Temperature Coefficient
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Applications

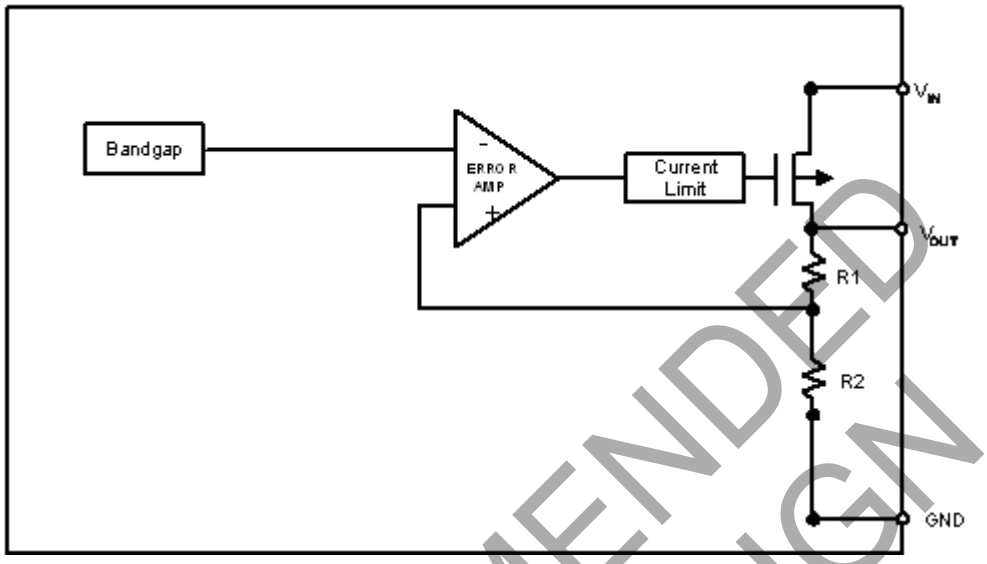
- CD and MP3 players
- Cellular and PCS phones
- Digital still cameras
- Hand-held computers

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated’s definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Descriptions

Pin Name	Pin No.	Function
GND	1	Ground
V_{IN}	2	Supply Voltage
V_{OUT}	3	Voltage Output

Functional Block Diagram



Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
ESD HBM	Human Body Model ESD Protection		3	KV
ESD MM	Machine Model ESD Protection		450	V
V_{IN}	Input Voltage		+6	V
P_D	Power Dissipation @ T_A = +25ºC (Note 4)	SOT89-3L	578	mW
T_{MJ}	Maximum Junction Temperature		150	ºC

Note: 4. Maximum P_D is under minimum recommended pad layout condition.

Recommended Operating Conditions

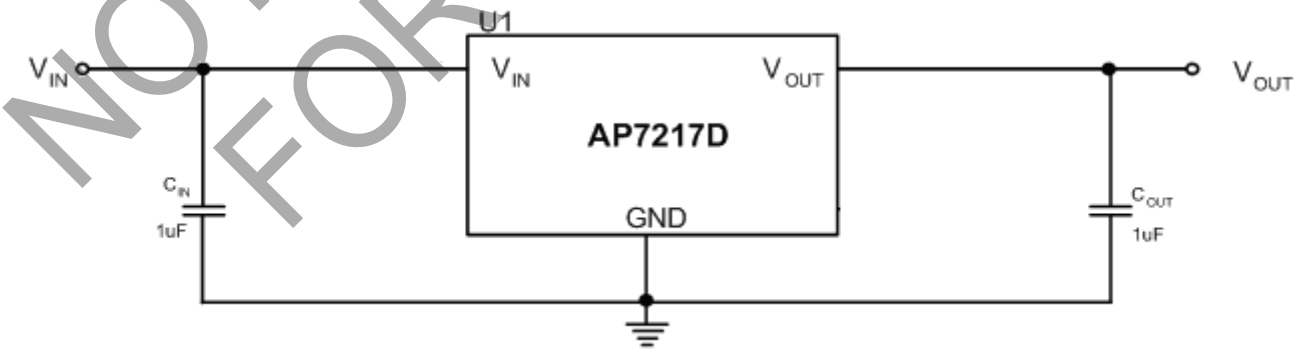
Symbol	Parameter	Min	Max	Unit
V_{IN}	Input Voltage	2.5	5.5	V
I_{OUT}	Output Current	0	600	mA
T_A	Operating Ambient Temperature	-40	85	ºC
T_J	Operating Junction Temperature	-40	125	ºC

Electrical Characteristics (T_A = +25°C, C_{IN} = 1µF, C_{OUT} = 1µF, V_{IN} = 5V, unless otherwise noted.)

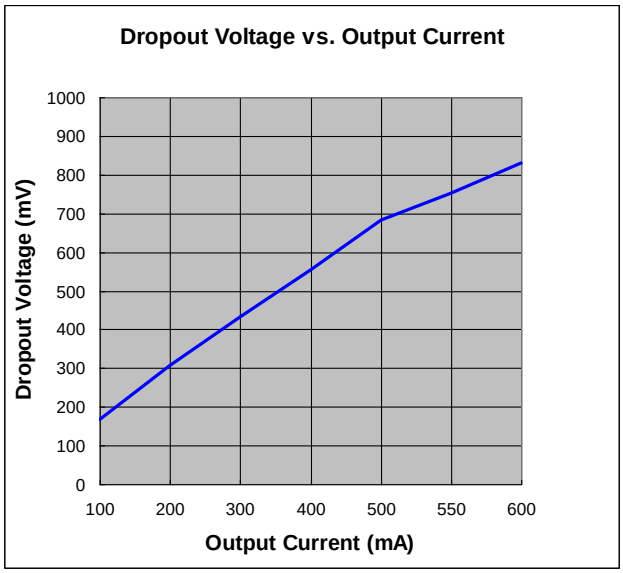
Symbol	Parameter	Test Conditions	Min	Typ.	Max	Unit
I_Q	Quiescent Current	I_O = 0mA	—	40	60	µA
V_{OUT}	Output Voltage Accuracy	I_O = 30mA	1.176	1.2	1.224	V
	V_{OUT} Temperature Coefficient	-40°C to 85°C, I_{OUT} = 30mA	—	±100	—	ppm/°C
$V_{DROPOUT}$	Dropout Voltage	I_{OUT} = 600mA, V_{OUT} = 1.2V	—	850	1300	mV
I_{OUT}	Maximum Output Current	—	600	—	—	mA
I_{LIMIT}	Current Limit	—	—	850	—	mA
I_{SHORT}	Short Circuit Current	—	—	200	—	mA
ΔV_{LINE}	Line Regulation	2.5V ≤ V_{IN} ≤ 5.5V; I_{OUT} = 30mA	—	0.2	—	%/V
ΔV_{LOAD}	Load Regulation (Note 5)	1mA ≤ I_{OUT} ≤ 300mA	—	15	35	mV
		1mA ≤ I_{OUT} ≤ 600mA	—	30	55	mV
PSRR	Power Supply Rejection	V_{IN} = 4.3V+0.5Vp-pAC, I_{OUT} = 50mA	—	—	—	dB
—	Thermal Shutdown Temperature	—	—	150	—	°C
—	Thermal Shutdown Hysteresis	—	—	30	—	°C
θ_{JA}	Thermal Resistance Junction-to-Ambient	SOT89-3L (Note 6)	—	173	—	°C/W
θ_{JC}	Thermal Resistance Junction-to-Case	SOT89-3L (Note 6)	—	51	—	°C/W

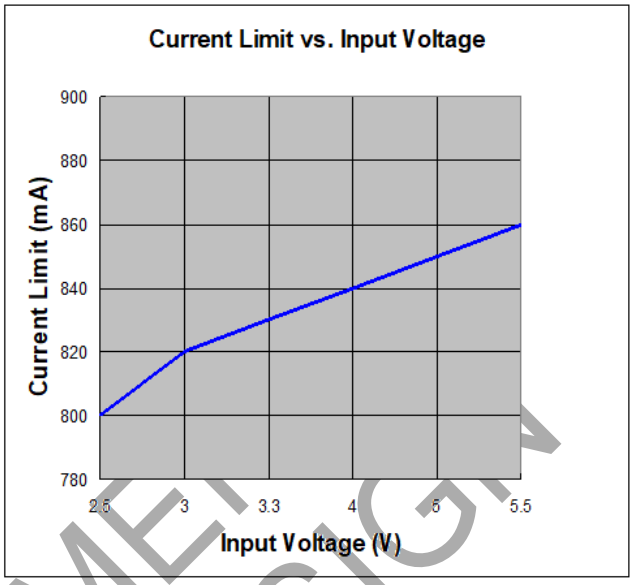
Notes: 5. Regulation is measured at constant junction temperature by low duty cycle pulse testing.
6. Test condition for SOT89-3L: Devices mounted on FR-4 substrate, single sided PC board, 2oz copper, with minimum recommended pad layout, no air flow.

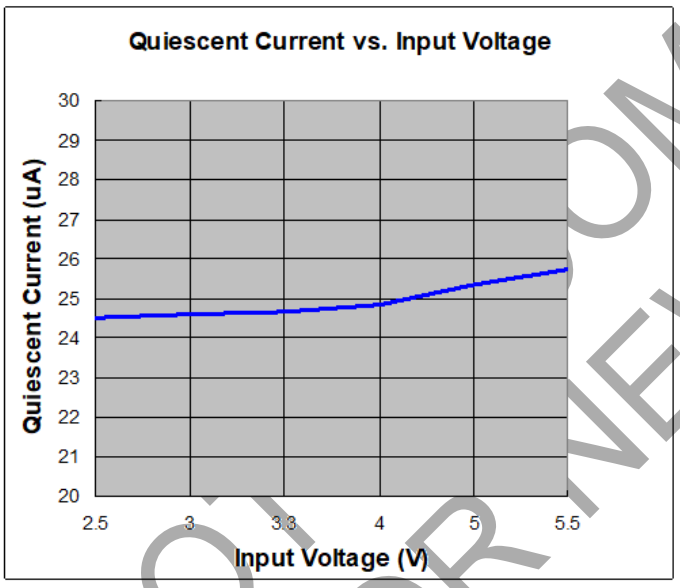
Typical Application

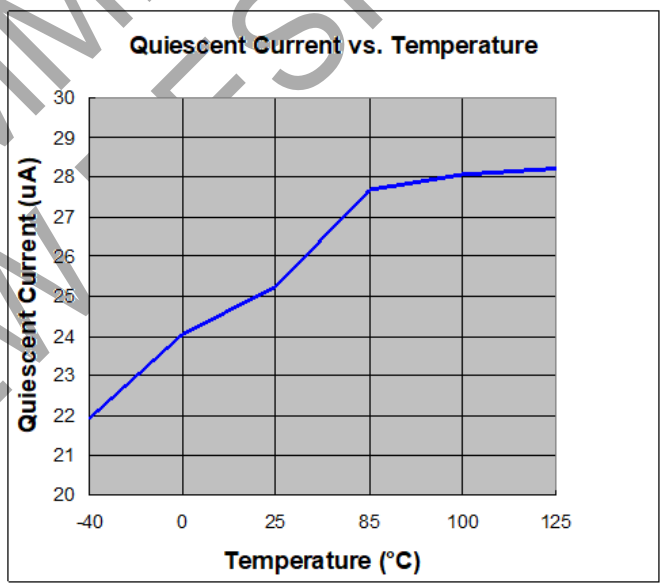


Typical Performance Characteristics

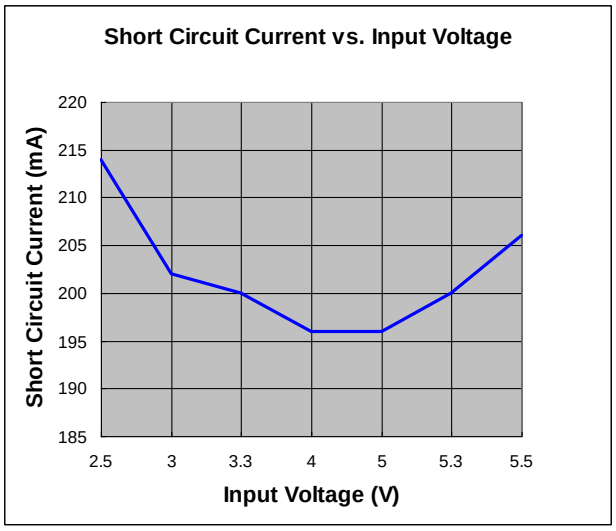


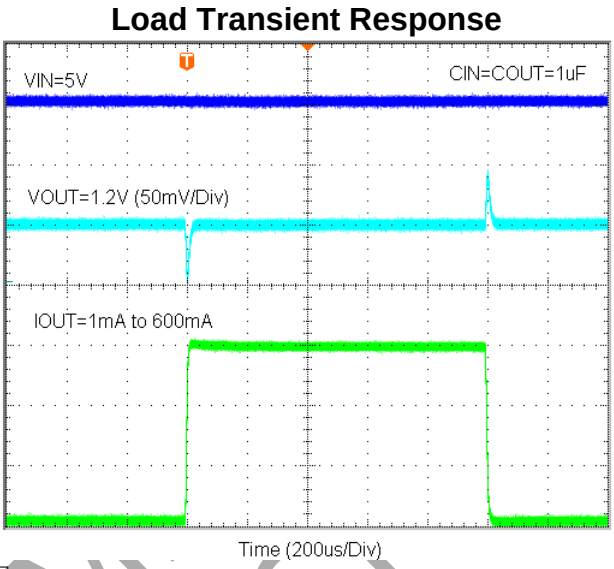


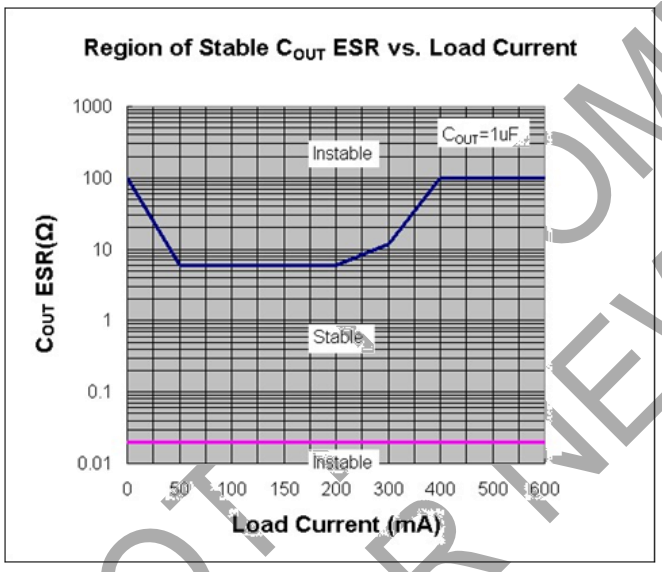




Typical Performance Characteristics (continued)







Application Information

Input Capacitor

A 1μF ceramic capacitor is recommended to connect between IN and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. A lower ESR (Equivalent Series Resistance) capacitor allows the use of less capacitance, while higher ESR type requires more capacitance. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both IN and GND.

Output Capacitor

The output capacitor is required to stabilize and help the transient response of the LDO. The AP7217D is designed to have excellent transient response for most applications with a small amount of output capacitance. The AP7217D is stable with any small ceramic output capacitors of 1.0μF or higher value, and the temperature coefficients of X7R or X5R type. Additional capacitance helps to reduce undershoot and overshoot during transient. For PCB layout, the output capacitor must be placed as close as possible to OUT and GND pins, and keep the leads as short as possible.

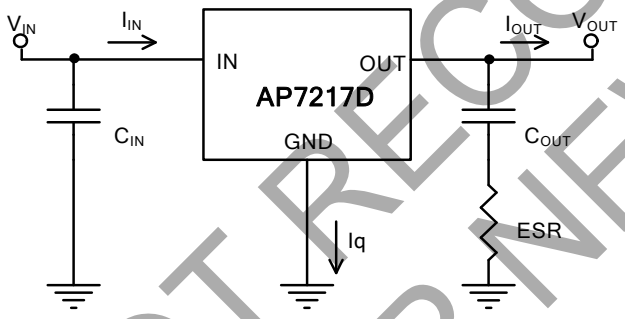
Thermal Shutdown Protection limits power dissipation in the AP7217D. When the operation junction temperature exceeds +150°C, the Over Temperature Protection circuit starts the thermal shutdown function and turns the pass element off. The pass element turn on again after the junction temperature cools by +30°C. For continuous operation, do not exceed recommend maximum operation junction temperature +125°C. The power dissipation definition in device is:

$$P_D = (V_{IN} - V_{OUT}) \times I_{OUT} + V_{IN} \times I_Q$$

The maximum power dissipation depends on the thermal resistance of IC package, PCB layout, the rate of surroundings airflow and temperature difference between junctions to ambient. The maximum power dissipation can be calculated by following formula:

$$P_{D(MAX)} = (T_{J(MAX)} - TA) / \theta_{JA}$$

Where $T_{J(MAX)}$ is the maximum operation junction temperature +125°C, T_A is the ambient temperature and the θ_{JA} is the junction to ambient thermal resistance.



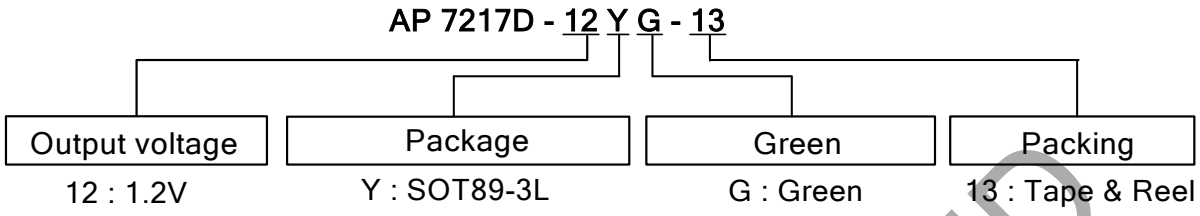
Current Limit Protection

When output current at OUT pin is higher than current limit threshold, the current limit protection will be triggered and clamp the output current to approximately 850mA to prevent over-current and to protect the regulator from damage due to overheating.

Short circuit protection

When V_{OUT} pin is shorted to GND or V_{OUT} voltage is less than 200mV, short circuit protection will be triggered and clamp the output current to approximately 200mA.

Ordering Information



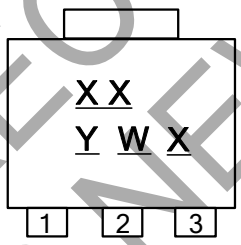
Part Number	Package (Note 7)	Package Code	Carrier	
			Qty.	Packing
AP7217D-12YG-13	SOT89-3L	Y	2500	13" Tape and Reel

Note: 7. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

SOT89-3L

(Top View)

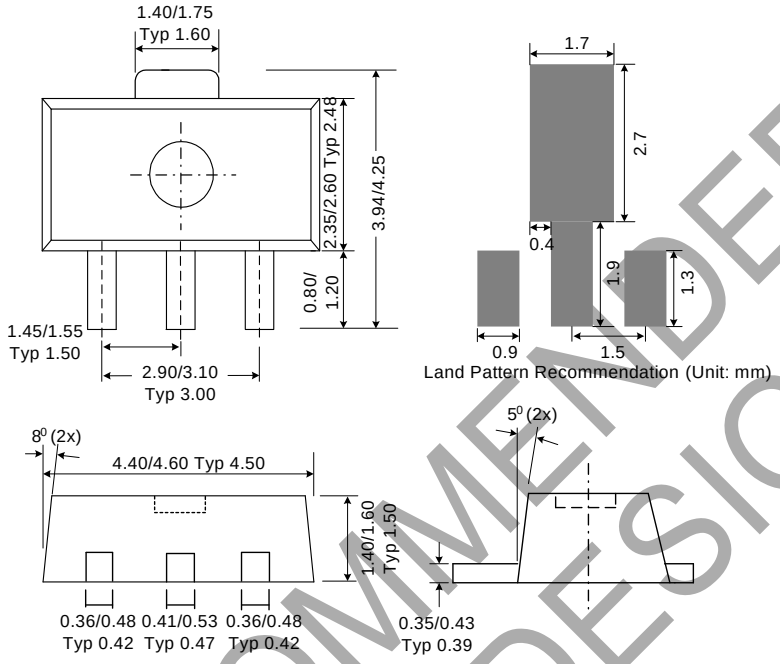


XX : N4 : AP7217D-12
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week;
z represents 52 and 53 week
X : Internal code
A~Z : Green

Package Outline Dimensions (All Dimensions in mm)

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT89-3L



IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.

5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

9. This Notice may be periodically updated with the most recent version available at https://www.diodes.com/about/company/terms-and-conditions/important-notice

www.diodes.com