

ZMR series

Fixed 2.5, 3.3 and 5 volt miniature voltage regulators

Description

The ZMR series of three terminal fixed positive voltage regulators feature internal current limit and will shut down under thermal overload conditions making the devices difficult to destroy.

The circuit design offers an exceptionally low quiescent current, only 30 μ A for the 2.5V device, ideal for low power applications. The initial devices in the series regulate to 2.5 or 5V with a drive capability up to 50mA.

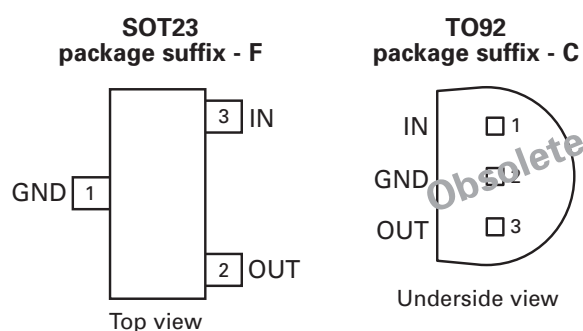
The device is designed with space saving in mind and is available in the small outline SOT23 package. The ZMR250 has expanded its input voltage range to 22.5V and the ZMR500 has expanded its input voltage range to 25V; equalling that of the ZMR25H and ZMR50H respectively.

The ZMR330 provides a 3.3V output over an input range of 5V to 24V.

Features

- Small outline SOT23 package
- 2.5V, 3.3V and 5V output
- Output current up to 50mA
- Very low quiescent current (30 μ A)
- Unconditionally stable
- Internal short circuit current limit

Pinout details



Ordering information

Order reference	Package	Part mark	Status	Reel size (inches)	Quantity per reel	Tape width (mm)
ZMR25HCL	TO92	ZMR25H	Obsolete	Loose	4000	-
ZMR25HCSTZ	TO92	ZMR25H	Obsolete	-	1500	-
ZMR25HFTA	SOT23	25X	Obsolete	7"	3000	8mm
ZMR250CL	TO92	ZMR250	Obsolete	Loose	4000	-
ZMR250CSTOB	TO92	ZMR250	Obsolete	12.5"	1500	-
ZMR250CSTZ	TO92	ZMR250	Obsolete	-	1500	-
ZMR250FTA	SOT23	25K	Active	7"	3000	8mm
ZMR330FTA	SOT23	330	Active	7"	3000	8mm
ZMR50HCL	TO92	ZMR50H	Obsolete	Loose	4000	-
ZMR50HCSTZ	TO92	ZMR50H	Obsolete	-	1500	-
ZMR50HFTA	SOT23	50R	Obsolete	7"	3000	8mm
ZMR500CL	TO92	ZMR500	Obsolete	Loose	4000	-
ZMR500CSTZ	TO92	ZMR500	Obsolete	Concertina	1500	-
ZMR500FTA	SOT23	50K	Active	7"	3000	8mm
ZMR500FTC	SOT23	50K	Obsolete	13"	10000	8mm

Absolute maximum ratings

Input voltage:

ZMR25H, ZMR250 22.5V

ZMR330 24V

ZMR50H, ZMR500 25V

Package power dissipation SOT23 500mW (Note 3)

($T_{amb}=25^{\circ}\text{C}$) TO92 600mW

Output current (I_O) 100mA

Operating temperature -55 to 125°C

Storage temperature -65 to 150°C

Note:

1. The maximum operating input voltage and output current of the device will be governed by the maximum power dissipation of the selected package. Maximum package power dissipation is specified at 25°C and must be linearly derated to zero at $T_{amb}=125^{\circ}\text{C}$.

2. The following data represents pulse test conditions with junction temperatures as indicated at the initiation of the test. Continuous operation of the devices with the stated conditions might exceed the power dissipation limits of the chosen package.

3. Maximum power dissipation for the SOT23 package, is calculated assuming that the device is mounted on a ceramic substrate measuring 15 x 15 x 0.6mm.

Recommended Operating Conditions

Input voltage range	Min	Max	Unit
ZMR25H/250	4.2	22.5	V
ZMR330	4.8	24	V
ZMR50H/500	7.0	25	V
Ambient temperature range	-55	125	°C

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ZMR25H and ZMR250

Electrical characteristics test conditions (unless otherwise stated): $T_j = 25^\circ\text{C}$,
 $I_O = 10\text{mA}$, $V_{IN} = 6.5\text{V}$

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_O	Output voltage		2.438	2.5	2.563	V
		$I_O = 0$ to 50mA $T_j = -55$ to 125°C	2.360		2.640	V
		$V_{IN} = 4.5$ to 22.5V $I_O = 0$ to 50mA $T_j = -55$ to 125°C	2.360		2.640	V
ΔV_O	Line regulation	$V_{IN} = 4.5$ to 22.5V		5	15	mV
ΔV_O	Load regulation	$I_O = 0$ to 50mA		20	30	mV
		$I_O = 0$ to 10mA		12		mV
I_S	Supply current	$T_j = -55$ to 125°C		30	40	μA
ΔI_S	Supply current change	$I_O = 0$ to 50mA		1	± 10	μA
		$V_{IN} = 4.5$ to 22.5V		2	10	μA
V_N	Output noise voltage	$f = 10\text{Hz}$ to 10kHz		65		$\mu\text{V rms}$
$\Delta V_{IN}/\Delta V_O$	Ripple rejection	$V_{IN} = 6.3$ to 18V $f = 120\text{Hz}$	55	75		dB
V_{IN}	Input voltage required to maintain regulation			3.9		V
$\Delta V_O / \Delta T$	Average temperature coefficient of V_O	$I_O = 5.0\text{mA}$ $T_j = -55$ to 125°C		0.275	0.700	$\text{mV}/^\circ\text{C}$

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ZMR330

Electrical characteristics test conditions (unless otherwise stated): $T_j = 25^\circ\text{C}$,
 $I_O = 10\text{mA}$, $V_{IN} = 7\text{V}$

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_O	Output voltage		3.217	3.3	3.383	V
		$I_O = 0$ to 50mA $T_j = -55$ to 125°C	3.148		3.393	V
		$V_{IN} = 5$ to 24V $I_O = 0$ to 50mA $T_j = -55$ to 125°C	3.148		3.408	V
ΔV_O	Line regulation	$V_{IN} = 5$ to 24V		5	15	mV
ΔV_O	Load regulation	$I_O = 0$ to 50mA		20	50	mV
		$I_O = 0$ to 10mA		13		mV
I_S	Supply current	$T_j = -55$ to 125°C		120	170	μA
ΔI_S	Supply current change	$I_O = 0$ to 50mA		5	10	μA
		$V_{IN} = 5$ to 20V		2	10	μA
V_N	Output noise voltage	$f = 10\text{Hz}$ to 10kHz		80		$\mu\text{V rms}$
$\Delta V_{IN}/\Delta V_O$	Ripple rejection	$V_{IN} = 6$ to 20V $f = 120\text{Hz}$	55			dB
V_{IN}	Input voltage required to maintain regulation	$V_{OUT} = 3.217\text{V}$		4.74		V

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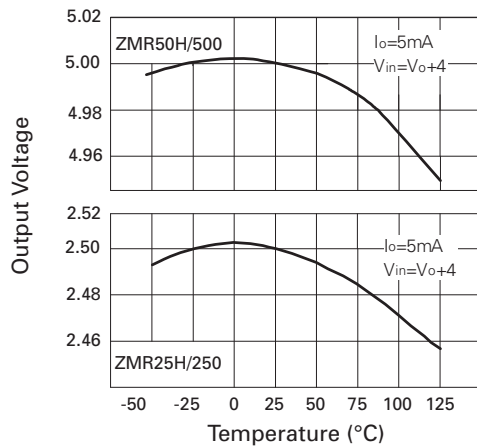
ZMR50H and ZMR500

Electrical characteristics test conditions (unless otherwise stated): $T_j = 25^\circ\text{C}$,
 $I_O = 10\text{mA}$, $V_{IN} = 10\text{V}$

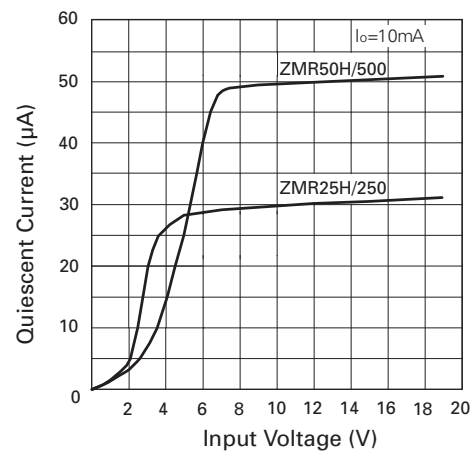
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_O	Output voltage		4.785	5	5.125	V
		$I_O = 0$ to 50mA $T_j = -55$ to 125°C	4.780		5.160	V
		$V_{IN} = 7$ to 25V $I_O = 0$ to 50mA $T_j = -55$ to 125°C	4.780		5.175	V
ΔV_O	Line regulation	$V_{IN} = 7$ to 25V		5	15	mV
ΔV_O	Load regulation	$I_O = 0$ to 50mA		25	40	mV
		$I_O = 0$ to 10mA		15		mV
I_S	Supply current	$T_j = -55$ to 125°C		50	70	μA
ΔI_S	Supply current change	$I_O = 0$ to 50mA		1	± 10	μA
		$V_{IN} = 7$ to 25V		2	10	μA
V_N	Output noise voltage	$f = 10\text{Hz}$ to 10kHz		90		$\mu\text{V rms}$
$\Delta V_{IN}/\Delta V_O$	Ripple rejection	$V_{IN} = 8$ to 18V $f = 120\text{Hz}$	55	72		dB
V_{IN}	Input voltage required to maintain regulation			6.7		V
$\Delta V_O / \Delta T$	Average temperature coefficient of V_O	$I_O = 5.0\text{mA}$ $T_j = -55$ to 125°C		0.275	0.700	$\text{mV}/^\circ\text{C}$

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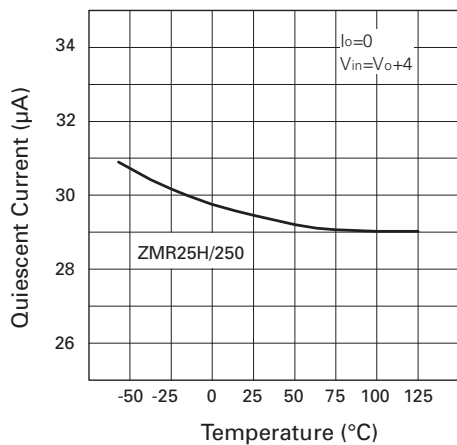
Typical characteristics



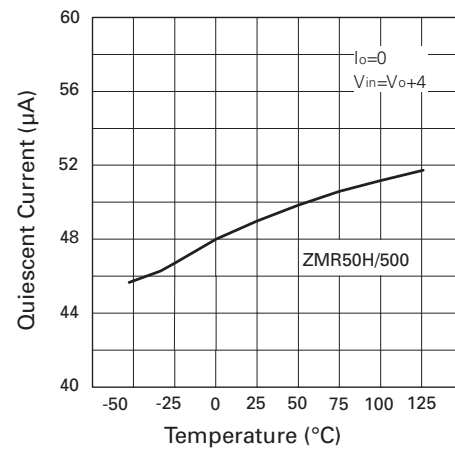
Output Voltage Temperature



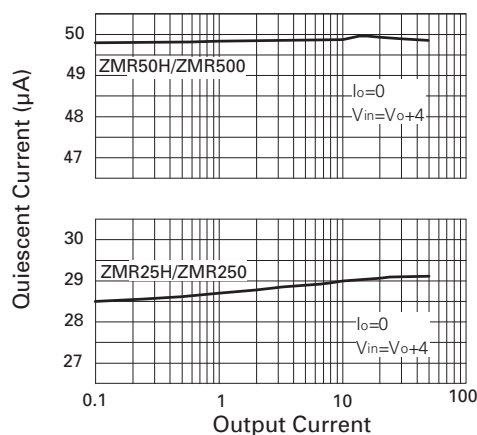
Quiescent Current v Voltage



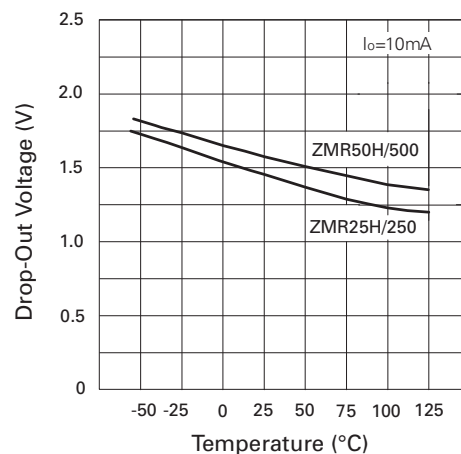
Quiescent Current v Temperature



Quiescent Current v Temperature



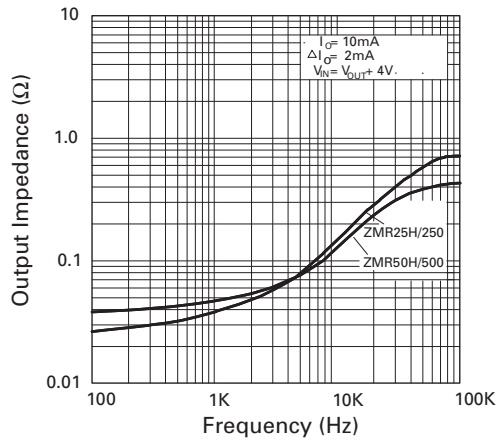
Quiescent Current v Output Current



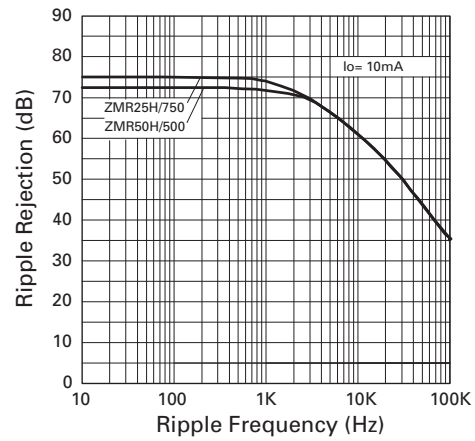
Drop-Out Voltage v Temperature

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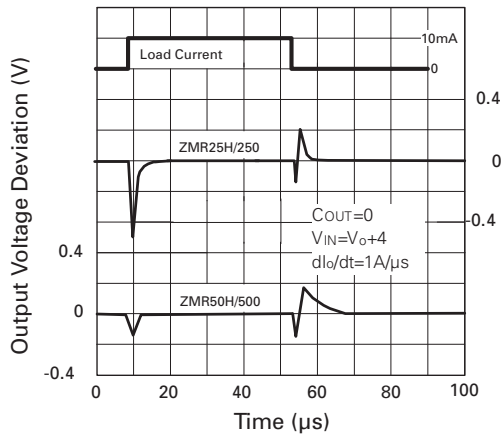
Typical characteristics



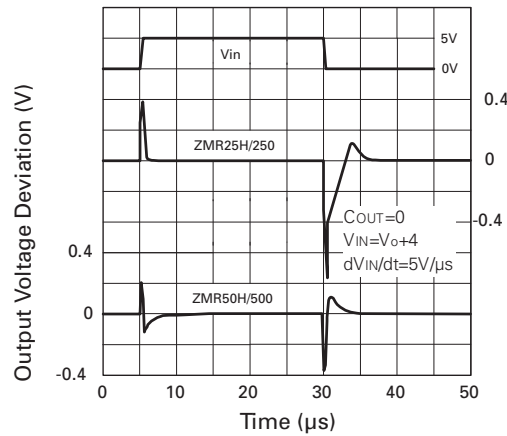
Output Impedance v Frequency



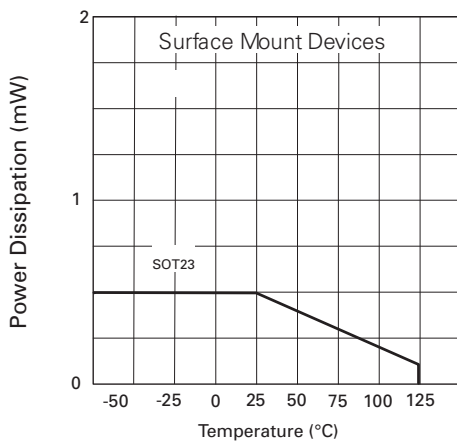
Ripple Rejection v Ripple Frequency



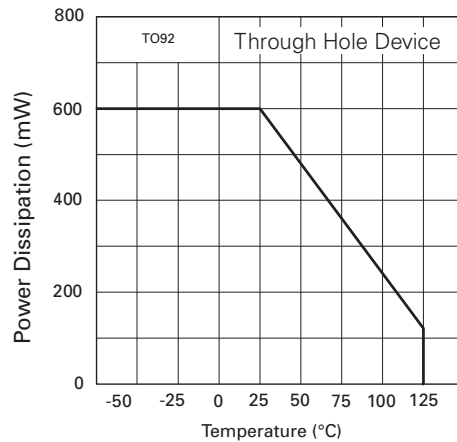
Load Transient Response



Line Transient Response



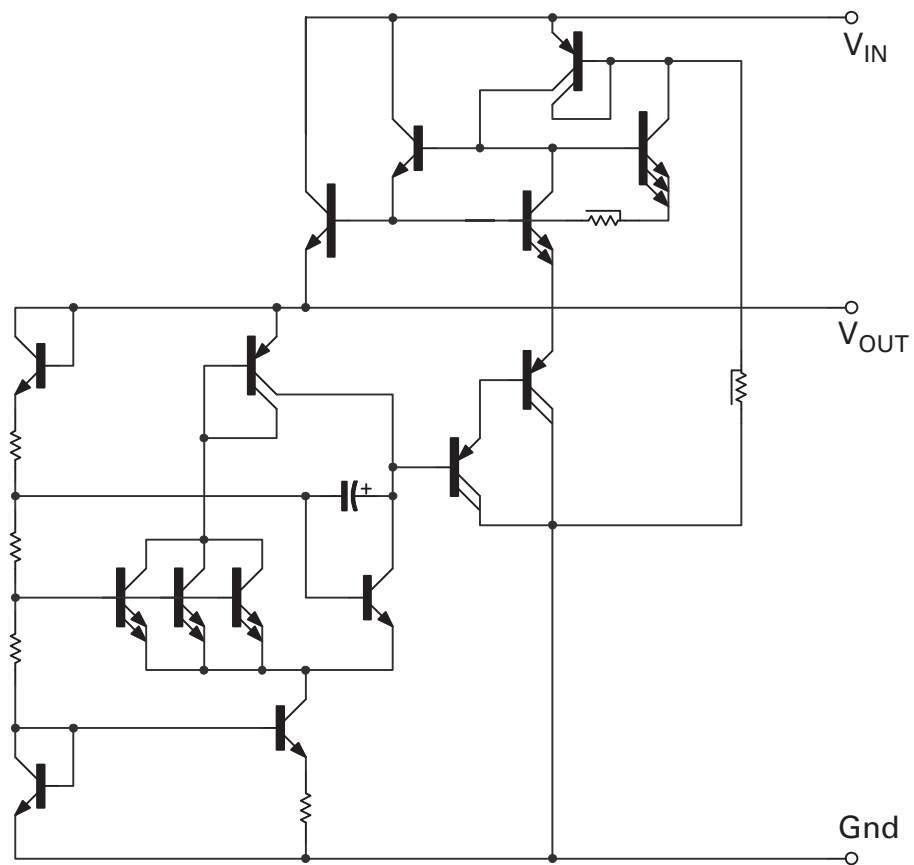
Power Derating



Power Derating

ZMR series

Schematic diagram

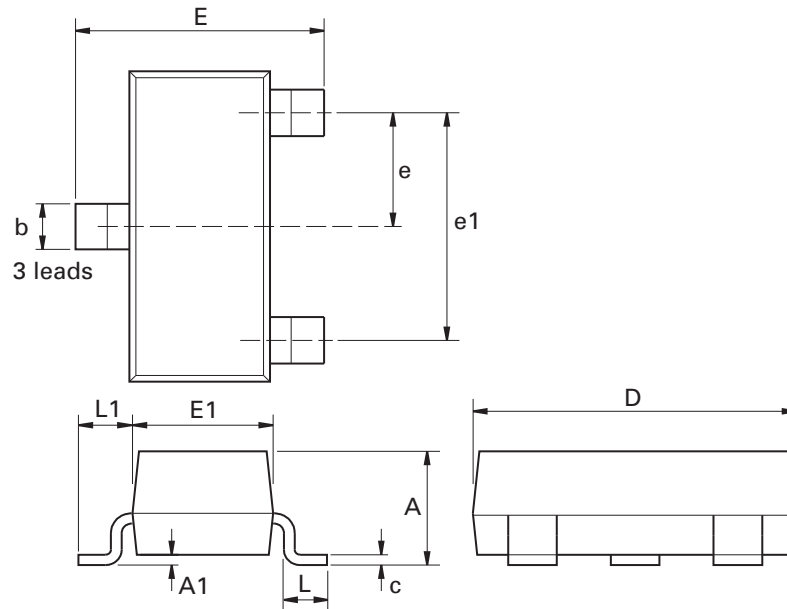


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Package outline - SOT23

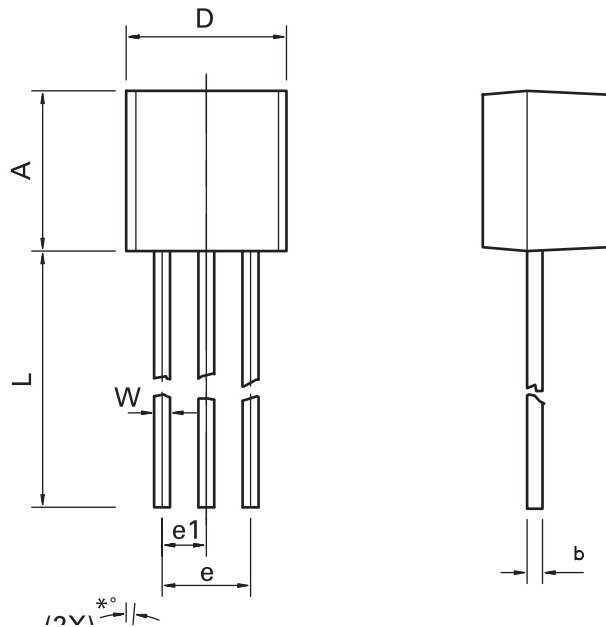


Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Max.	Max.
A	-	1.12	-	0.044	e1	1.90 NOM		0.075 NOM	
A1	0.01	0.10	0.0004	0.004	E	2.10	2.64	0.083	0.104
b	0.30	0.50	0.012	0.020	E1	1.20	1.40	0.047	0.055
C	0.085	0.120	0.003	0.008	L	0.25	0.62	0.018	0.024
D	2.80	3.04	0.110	0.120	L1	0.45	0.62	0.018	0.024
e	0.95 NOM		0.0375 NOM		-	-	-	-	-

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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Package outline - TO92



DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.32	4.95	0.170	0.195
b	0.36	0.51	0.014	0.020
E	3.30	3.94	0.130	0.155
e	2.41	2.67	0.095	0.105
e1	1.14	1.40	0.045	0.055
L	12.70	15.49	0.500	0.610
R	2.16	2.41	0.085	0.095
S1	1.14	1.52	0.045	0.060
W	0.41	0.56	0.016	0.022
D	4.45	4.95	0.175	0.195
*°	4°	6°	4°	6°

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

Definitions

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or

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"Preview"	Future device intended for production at some point. Samples may be available
"Active"	Product status recommended for new designs
"Last time buy (LTB)"	Device will be discontinued and last time buy period and delivery is in effect
"Not recommended for new designs"	Device is still in production to support existing designs and production
"Obsolete"	Production has been discontinued

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"Draft version"	This term denotes a very early datasheet version and contains highly provisional information, which may change in any manner without notice.
"Provisional version"	This term denotes a pre-release datasheet. It provides a clear indication of anticipated performance. However, changes to the test conditions and specifications may occur, at any time and without notice.
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