

1.5 A LDO regulators in industry's smallest package for mobile applications

The forty-seven products in the "TCR15AG series" use the WCSP6F package, which is the smallest in the industry^[1]. These products are LDO regulator ICs suitable for mobile and module applications that require smaller and lower profile products. Despite its small package, the TCR15AG series feature high output current of 1.5 A, suiting it for power supply applications in Wi-Fi[®]^[2] chipsets for smartphones and tablets, cameras and wireless modules.

The new series can also control power supply in applications requiring a high current, including laptop PCs, digital camcorders, storage devices and set-top boxes.

TCR15AG series deliver the industry's best-in-class^[1] ripple rejection ratio and load transient response. They significantly reduce the ripple noise from a power management IC (PMIC) or a DC-DC converter that is often a limiting factor in the power supply for cameras and RF^[3] circuits. They help to minimize output voltage fluctuations that occur in response to sharp changes in current during mode transitions in cameras and RF^[3] circuits.

Low voltage dropout is secured by use of an external bias voltage pin, which helps to improve system power efficiency and contributes to longer charge life for the batteries of mobile products.

The series offers two kinds of output voltage—adjustable output between 0.60 V and 3.6 V via external resistors, and fixed output voltages from 0.65 V to 3.6 V—enabling support for a wide range of power supply applications.

Extensive protection features of the TCR15AG series include overcurrent protection and thermal shutdown, positioning it as a high-efficiency LDO solution for applications requiring highly regulated voltage in the high-current region and low power consumption.



Features

- High output current of 1.5 A in the industry's smallest^[1] WCSP6F package
- The industry's highest^[1] ripple rejection ratio and fastest load transient response; highly suited to camera and RF^[3] applications
- Low dropout voltage, a requirement for high-efficiency power supply applications

Applications

- Smart phones
- Tablets



Smart phones

Product Specifications

Part number	Package		Operating ranges					Electrical characteristics (@T _j =25°C)			
	Name	Size typ. (mm)	Output current I _{OUT} (A)	Bias voltage V _{BIAS} min/max @V _{OUT} ≤1.1 V, I _{OUT} =1 mA (V)	Bias voltage V _{BIAS} min/max @V _{OUT} >1.1 V, I _{OUT} =1 mA (V)	Output voltage V _{OUT} typ. (V)	Input voltage V _{IN} min/max @I _{OUT} =1 mA (V)	Quiescent current I _B typ. @I _{OUT} =0 mA ^[4] (μA)	Ripple rejection ratio R.R.(V _{IN}) typ. ^[5] (dB)	Dropout voltage V _{DO} typ. @V _{BIAS} =3.3 V, I _{OUT} =1.5 A ^[6] (mV)	Load transient response ΔV _{OUT} typ. @I _{OUT} =0.01↔1.5 A (mV)
TCR15AG series	WCSP6F	1.2×0.8, t=0.33 (max)	0 to 1.5	2.5/5.5	V _{OUT} +1.4 /5.5	0.65 to 3.6 ^[7]	V _{OUT} +V _{DO} /V _{BIAS}	25	95	120	-100, +115

Notes:

[1] As of November 2017 for LDO regulator ICs with an output current of 1.5 A. Toshiba Electronic Devices & Storage Corporation survey.

[2] Wi-Fi is a registered trademark of Wi-Fi Alliance.

[3] RF (Radio Frequency)

[4] Not including a control pull down current (I_{CT}) and a current flowing through an external resistor for an adjustable output LDO regulator.

[5] @V_{BIAS}=3.3 V, V_{IN}=V_{OUT}+1 V, I_{OUT}=10 mA, V_{OUT}=0.9 V, f=1 kHz, V_{IN} Ripple=200 mVp-p, T_a=25°C, C_{OUT}=4.7 μF

[6] Measured at 0.9 V output with the TCR15AGADJ adjustable output voltage LDO regulator. V_{DO}=V_{IN1}^{*1}-(V_{OUT1}^{*2}-100 mV)

*1: V_{IN1} is an input voltage when the output voltage drops from V_{OUT1} to 100 mV.

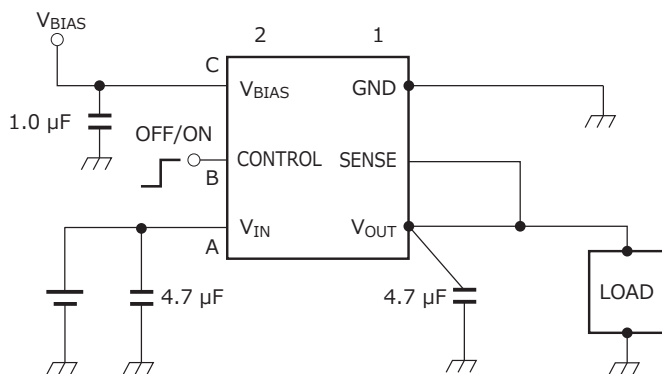
*2: V_{OUT1} is an output voltage when V_{IN}=V_{OUT}+0.5 V.

[7] 0.60 V to 3.6 V for TCR15AGADJ (adjustable output voltage type).

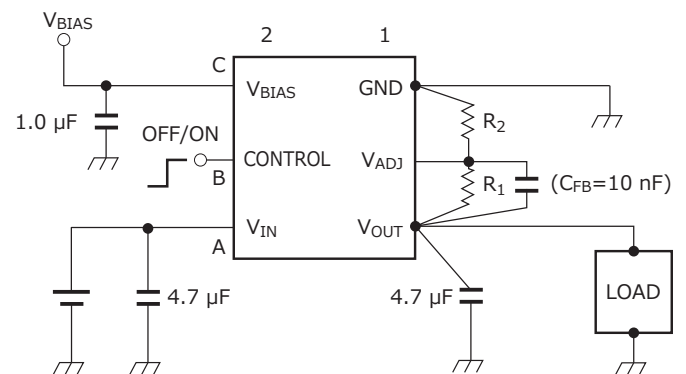
Lineup

No.	Part number	Output voltage typ. (V)	No.	Part number	Output voltage typ. (V)	No.	Part number	Output voltage typ. (V)	No.	Part number	Output voltage typ. (V)
1	TCR15AG065	0.65	13	TCR15AG125	1.25	25	TCR15AG21	2.1	37	TCR15AG30	3.0
2	TCR15AG07	0.7	14	TCR15AG13	1.3	26	TCR15AG22	2.2	38	TCR15AG305	3.05
3	TCR15AG075	0.75	15	TCR15AG135	1.35	27	TCR15AG23	2.3	39	TCR15AG31	3.1
4	TCR15AG08	0.8	16	TCR15AG14	1.4	28	TCR15AG24	2.4	40	TCR15AG32	3.2
5	TCR15AG085	0.85	17	TCR15AG15	1.5	29	TCR15AG25	2.5	41	TCR15AG325	3.25
6	TCR15AG09	0.9	18	TCR15AG16	1.6	30	TCR15AG26	2.6	42	TCR15AG33	3.3
7	TCR15AG095	0.95	19	TCR15AG17	1.7	31	TCR15AG27	2.7	43	TCR15AG335	3.35
8	TCR15AG10	1.0	20	TCR15AG175	1.75	32	TCR15AG275	2.75	44	TCR15AG34	3.4
9	TCR15AG105	1.05	21	TCR15AG18	1.8	33	TCR15AG28	2.8	45	TCR15AG35	3.5
10	TCR15AG11	1.1	22	TCR15AG185	1.85	34	TCR15AG285	2.85	46	TCR15AG36	3.6
11	TCR15AG115	1.15	23	TCR15AG19	1.9	35	TCR15AG29	2.9	47	TCR15AGADJ	Adjustable
12	TCR15AG12	1.2	24	TCR15AG20	2.0	36	TCR15AG295	2.95	-	-	-

Pin Assignment and Application Circuit Example



TCR15A series^[8]



TCR15AGADJ

Notes:

[8] Not for TCR15AGADJ

The application circuits shown in this document are provided for reference purposes only. Thorough evaluation is required, especially at the mass-production design stage. Toshiba Electronic Devices & Storage Corporation does not grant any license to any industrial property rights by providing these examples of application circuits.

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