300 mA small LDO regulator ICs combined low quiescent bias current with high ripple rejection ratio and fast load transient response

The “TCR3UG series” are 300 mA output and small size LDO regulator ICs for power management system built in IoT modules, wearable devices smartphones etc.
The new products, TCR3UG series regulators feature low quiescent bias current and have improved tradeoff between ripple rejection ratio and load transient response in industry's highest level.
The TCR3UG series regulators deliver the industry’s best trade-offs between these characteristics[1]. They also deliver various protection features, such as thermal shutdown, overcurrent protection and inrush current suppression. Housed in the industry-leading small WCSP4F package[1], which measures 0.645×0.645 mm (typ.), t=0.33 mm (max), the TCR3UG series helps reduce the size and thickness of mobile applications.
The new LDO regulators are suitable for use in sensor power supply in applications that require long battery life, and applications susceptible to noise and voltage fluctuations. The series offers 62 LDO regulators, available with 31 output voltages, ranging from 0.8 V to 5.0 V, and with and without automatic output discharging, allowing easy selection for the regulator that best suits the customer’s requirements.


WCSP4F

Features

- Low quiescent current: $I_{B(ON1)}$=0.34 μA (typ.)
- High ripple rejection ratio, high speed load transient response:
  R.R.=70 dB (typ.), ΔV_{OUT}=60 mV (typ.)
- Small WCSP4F package: 0.645×0.645 mm (typ.), t=0.33 mm (max)

Applications

- IoT modules, wearable devices and smart phones


Smartphones

Product Specifications

(Unless otherwise specified, @T_j=25℃)

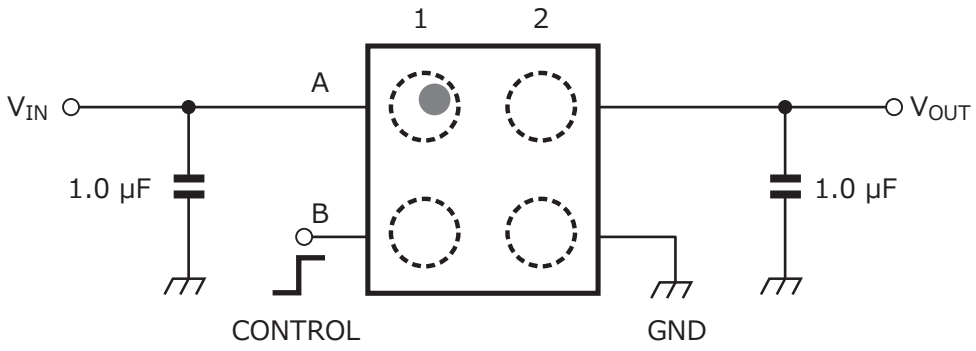
Part number	Package		Absolute maximum ratings	Output voltage V_{OUT} typ. (V)	Input voltage V_{IN} @I_{OUT}=1 mA (V)	Quiescent current $I_{B(ON1)}$ typ. @V_{OUT}≤1.5 V, I_{OUT}=0 mA[2] (μA)	Ripple rejection ratio R.R. typ. @V_{OUT}=0.8 V, I_{OUT}=10 mA, f=1 kHz, T_a=25℃[2] (dB)	Drop-out voltage V_{IN}-V_{OUT} typ. @V_{OUT}=3.3 V, I_{OUT}=300 mA (mV)	Load transient response ΔV_{OUT} typ. @V_{IN}=3.3 V, V_{OUT}=0.8 V, I_{OUT}=1⇔50 mA[2] (mV)
	Name	Size typ. (mm)	Output current I_{OUT} @T_a=25℃ (mA)						
TCR3UG series	WCSP4F	0.645×0.645, t=0.33 (max)	300	0.8 to 5.0	1.5 to 5.5	0.34	70	140	±60

Notes:
[1] By a output current 300 mA LDO regulator, as of September 2017, from a survey by Toshiba Electronic Devices & Storage Corporation.
[2] Common test conditions (Unless otherwise specified) @V_{IN}=V_{OUT}+1 V (V_{OUT}>1.5 V), V_{IN}=2.5 V (V_{OUT}≤1.5 V), C_{IN}=1.0 μF, C_{OUT}=1.0 μF

Lineup

No.	Part number	Output voltage typ. (V)	Auto-discharge	No.	Part number	Output voltage typ. (V)	Auto-discharge	No.	Part number	Output voltage typ. (V)	Auto-discharge
1	TCR3UG08A	0.8		22	TCR3UG30A	3.0		43	TCR3UG15B	1.5	
2	TCR3UG085A	0.85		23	TCR3UG31A	3.1		44	TCR3UG175B	1.75	
3	TCR3UG09A	0.9		24	TCR3UG32A	3.2		45	TCR3UG18B	1.8	
4	TCR3UG095A	0.95		25	TCR3UG33A	3.3		46	TCR3UG185B	1.85	
5	TCR3UG10A	1.0		26	TCR3UG35A	3.5		47	TCR3UG19B	1.9	
6	TCR3UG105A	1.05		27	TCR3UG36A	3.6	Yes	48	TCR3UG25B	2.5	
7	TCR3UG11A	1.1		28	TCR3UG41A	4.1		49	TCR3UG26B	2.6	
8	TCR3UG115A	1.15		29	TCR3UG42A	4.2		50	TCR3UG27B	2.7	
9	TCR3UG12A	1.2		30	TCR3UG45A	4.5		51	TCR3UG28B	2.8	
10	TCR3UG13A	1.3		31	TCR3UG50A	5.0		52	TCR3UG285B	2.85	
11	TCR3UG135A	1.35	Yes	32	TCR3UG08B	0.8		53	TCR3UG30B	3.0	No
12	TCR3UG15A	1.5		33	TCR3UG085B	0.85		54	TCR3UG31B	3.1	
13	TCR3UG175A	1.75		34	TCR3UG09B	0.9		55	TCR3UG32B	3.2	
14	TCR3UG18A	1.8		35	TCR3UG095B	0.95		56	TCR3UG33B	3.3	
15	TCR3UG185A	1.85		36	TCR3UG10B	1.0		57	TCR3UG35B	3.5	
16	TCR3UG19A	1.9		37	TCR3UG105B	1.05		58	TCR3UG36B	3.6	
17	TCR3UG25A	2.5		38	TCR3UG11B	1.1	No	59	TCR3UG41B	4.1	
18	TCR3UG26A	2.6		39	TCR3UG115B	1.15		60	TCR3UG42B	4.2	
19	TCR3UG27A	2.7		40	TCR3UG12B	1.2		61	TCR3UG45B	4.5	
20	TCR3UG28A	2.8		41	TCR3UG13B	1.3		62	TCR3UG50B	5.0	
21	TCR3UG285A	2.85		42	TCR3UG135B	1.35		-	-	-	-

Pin Assignment and Application Circuit Example



Recommended Application Circuit

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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