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October 2014



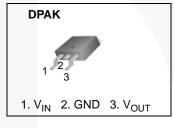
KA78RM33R Low Dropout Voltage Regulator

Features

- 0.5 A / 3.3 V Output Low-Dropout Voltage Regulator
- Low-Dropout Voltage (Max: 0.6 V)
- Over-Current Protection, Thermal Shutdown
- SOA Protection, Short-Circuit Protection

Description

The KA78RM33R is a low-dropout voltage regulator suitable for various electronic equipment. It provides constant voltage power source with surface-mount type package (DPAK). The dropout voltage is below 0.6 V in full-rated current 0.5 A. This regulator has over-current protection, thermal shut-down and the SOA (Safe operating Area) protection.

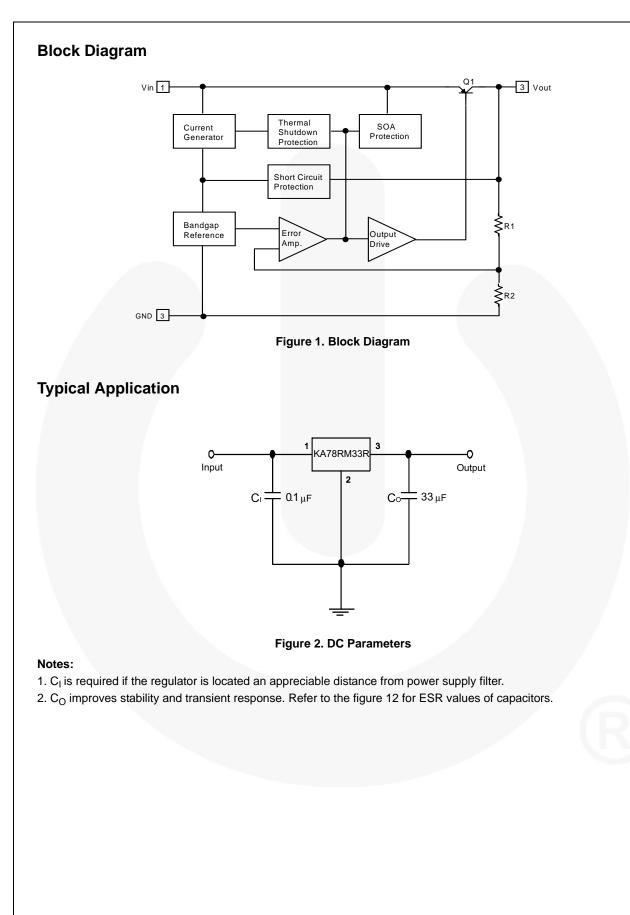


Ordering Information

Part Number	Operating Temperature Range	Top Mark Package		Packing Method	
KA78RM33RTF	-40 to +125°C	KA78RM33	DPAK	Tape and Reel	
KA78RM33RTM	-40 10 +125 C	KA78RM33	DPAK	Tape and Reel	

* Refer to below unit orientation figure for TM / TF suffix packing.





Absolute Maximum Ratings

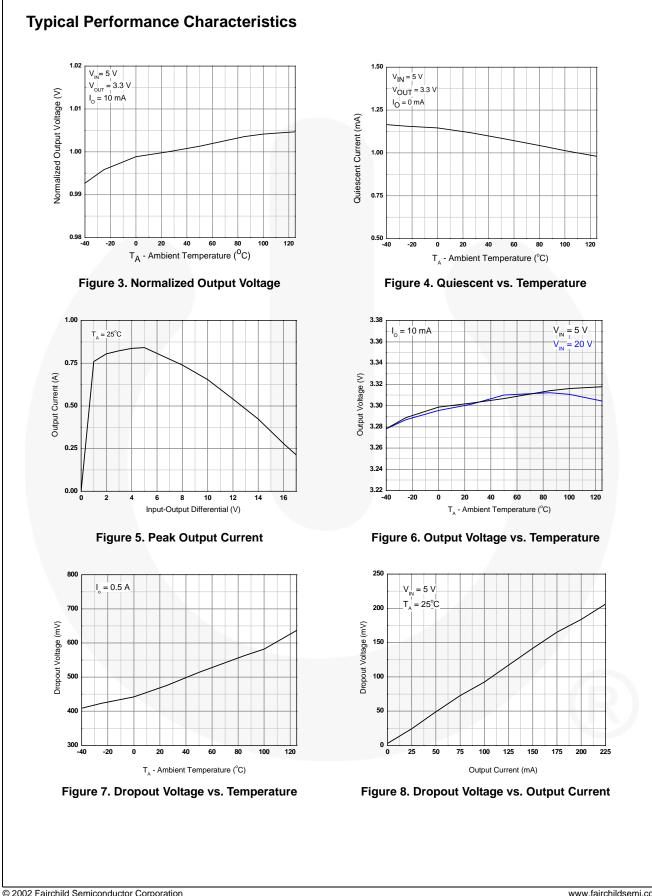
Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_A = 25^{\circ}$ C unless otherwise noted.

Symbol	Parameter	Value	Remark	Unit	
V _{IN}	Input Voltage	20		V	
Ι _Ο	Output Current	0.5		А	
R_{\thetaJA}	Thermal Resistance Junction-Air	110	No Heatsink	°C/W	
PD	Power Dissipation	Internally limited			
TJ	Junction Temperature	150		°C	
T _{OPR}	Operating Temperature	-40 to +125		°C	

Electrical Characteristics

Values are at $T_A = 25^{\circ}$ C, $V_{IN} = 5$ V, $I_O = 0.25$ A unless otherwise specified.

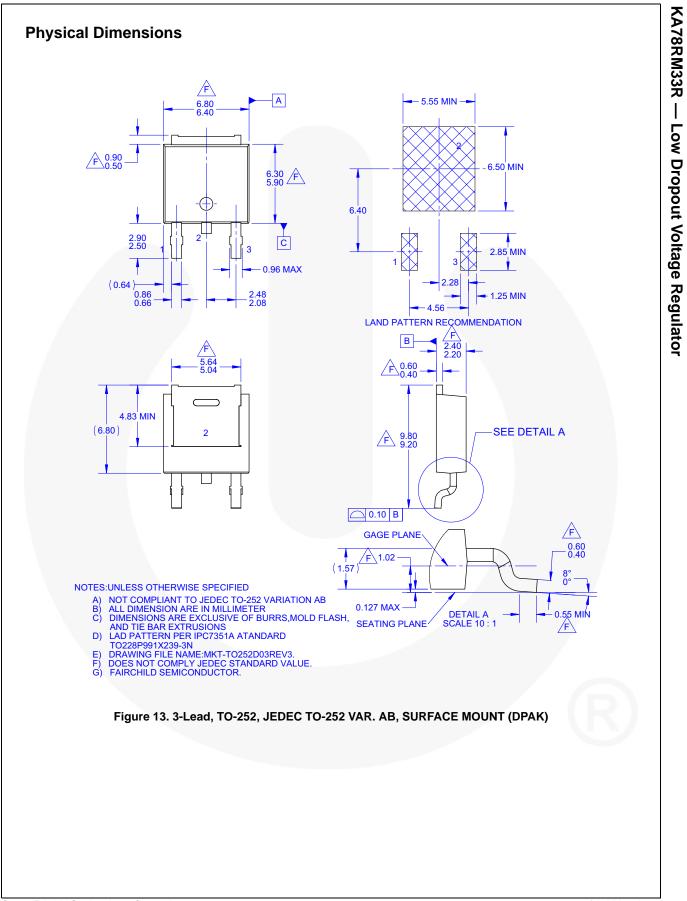
Symbol	Parameter	Conditions	Min.	Тур.	Max.	Unit
V _{OUT}	Output Voltage	I _O =10 mA	3.22	3.30	3.38	V
R _{LOAD}	Load Regulation	5 mA < I _O < 0.5 A		2.0	20	mV
R _{LINE}	Line Regulation	4.3 V < V _{IN} < 16 V		2.0	20	mV
R _R	Ripple Rejection Ratio	f = 120 Hz, V_{IN} =5 V ± 0.5 V_{RMS}	55			dB
V _{DROP}	Dropout Voltage	I _O = 0.5 A			0.6	V
ا _م	Quiescent Current I _O = 0 A			5.0	10	mA
I _{PK}	Peak Current	V _{IN} = 5 V	0.5	1.0		А
V _N	Output Noise Voltage	10 Hz < f < 100 kHz		50		μV_{RMS}
$\Delta V_{OUT} / \Delta T$	Temperature Coefficient of Output Voltage	-40°C < T _J < 125°C, I _O = 100 mA		-0.2		mV /°C



KA78RM33R — Low Dropout Voltage Regulator

KA78RM33R — Low Dropout Voltage Regulator

Typical Performance Characteristics (Continued) $I_{o} = 10 \text{ mA}$ = 25 °C T, I_ = 250 mA Quiescent Current (mA) Output Voltage (V) 3 2 l = 5 mA l_o = 50 mA l_o = 250 mA 0 L 0 0 4 6 10 12 14 16 18 20 2 8 20 0 12 16 Input Viltage (V) Input Voltage (V) Figure 10. Quiescent Current vs. Input Voltage Figure 9. Output Voltage vs. Input Voltage 1000 20 V_{IN} = 5V 100 Unstable Region 15 Quiescent Current (mA) -- 0.1uF -- 1uF -- 100uF 10 ESR (Ohms) Stable Region 10 0.1uF 1 Unstable Region 5 0.1 Lower unstable region applicable for 0.1uF only. 1uF and 100uF show no instability with low ESR value. 0.01 0 L 0.0 500 0.2 0.4 0.6 0.8 0 100 200 300 400 1.0 Output Current (V) Output Current (mA) Figure 12. Output Stability vs. Output Capacitor Figure 11. Quiescent Current vs. Output Current Change



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