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October 2014

# KA78RM33R Low Dropout Voltage Regulator

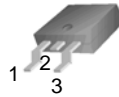
## Features

- 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.

### DPAK

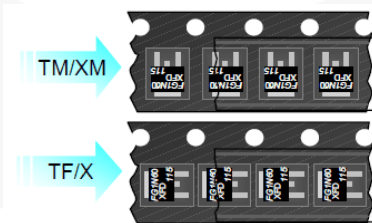


1.  $V_{IN}$  2. GND 3.  $V_{OUT}$

## Ordering Information

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

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



### Block Diagram

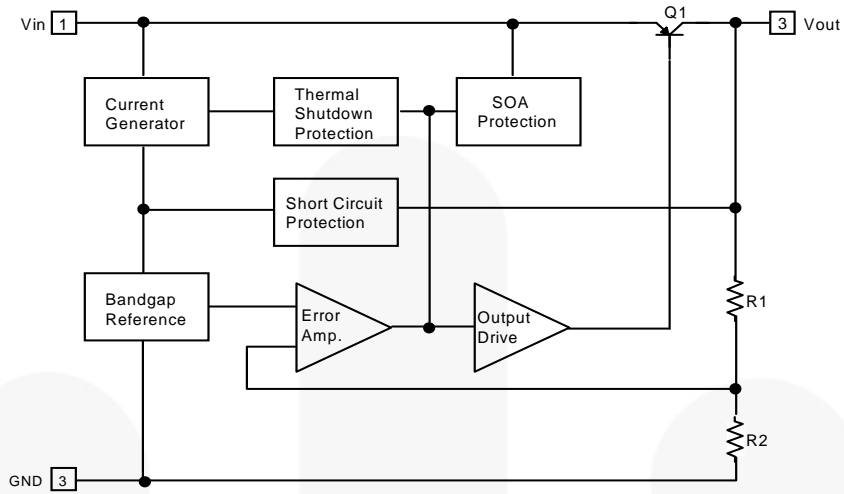


Figure 1. Block Diagram

### Typical Application

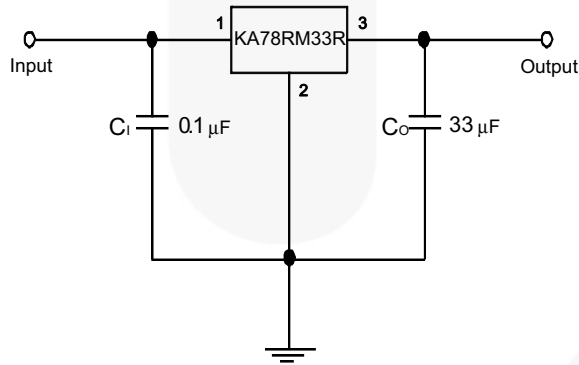


Figure 2. DC Parameters

**Notes:**

1.  $C_i$  is required if the regulator is located an appreciable distance from power supply filter.
2.  $C_o$  improves stability and transient response. Refer to the figure 12 for ESR values of capacitors.



## 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  $T_A = 25^\circ\text{C}$  unless otherwise noted.

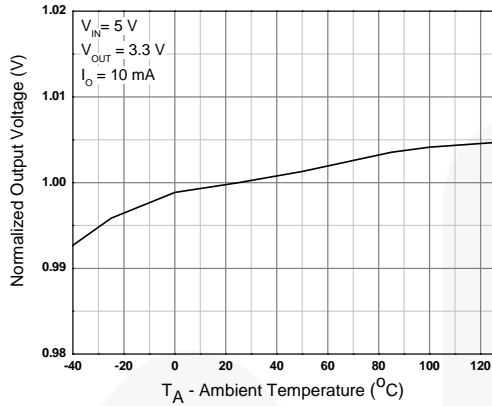
Symbol	Parameter	Value	Remark	Unit
$V_{IN}$	Input Voltage	20		V
$I_O$	Output Current	0.5		A
$R_{\theta JA}$	Thermal Resistance Junction-Air	110	No Heatsink	$^\circ\text{C}/\text{W}$
$P_D$	Power Dissipation	Internally limited		
$T_J$	Junction Temperature	150		$^\circ\text{C}$
$T_{OPR}$	Operating Temperature	-40 to +125		$^\circ\text{C}$

## Electrical Characteristics

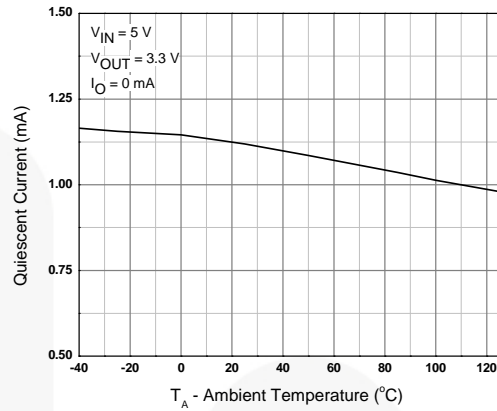
Values are at  $T_A = 25^\circ\text{C}$ ,  $V_{IN} = 5\text{ V}$ ,  $I_O = 0.25\text{ A}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{OUT}$	Output Voltage	$I_O = 10\text{ mA}$	3.22	3.30	3.38	V
$R_{LOAD}$	Load Regulation	$5\text{ mA} < I_O < 0.5\text{ A}$		2.0	20	mV
$R_{LINE}$	Line Regulation	$4.3\text{ V} < V_{IN} < 16\text{ V}$		2.0	20	mV
$R_R$	Ripple Rejection Ratio	$f = 120\text{ Hz}$ , $V_{IN} = 5\text{ V} \pm 0.5\text{ V}_{RMS}$	55			dB
$V_{DROP}$	Dropout Voltage	$I_O = 0.5\text{ A}$			0.6	V
$I_Q$	Quiescent Current	$I_O = 0\text{ A}$		5.0	10	mA
$I_{PK}$	Peak Current	$V_{IN} = 5\text{ V}$	0.5	1.0		A
$V_N$	Output Noise Voltage	$10\text{ Hz} < f < 100\text{ kHz}$		50		$\mu\text{V}_{RMS}$
$\Delta V_{OUT}/\Delta T$	Temperature Coefficient of Output Voltage	$-40^\circ\text{C} < T_J < 125^\circ\text{C}$ , $I_O = 100\text{ mA}$		-0.2		$\text{mV}/^\circ\text{C}$

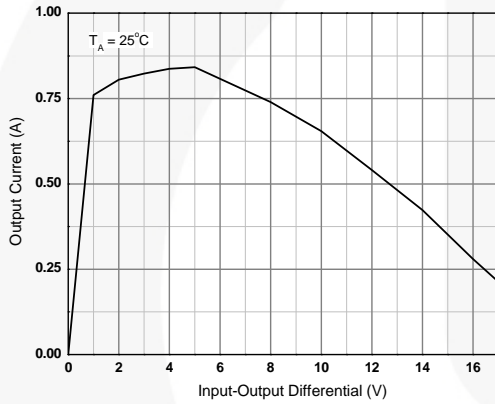
## Typical Performance Characteristics



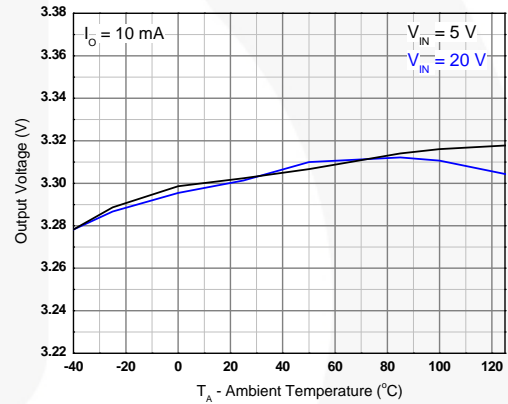
**Figure 3. Normalized Output Voltage**



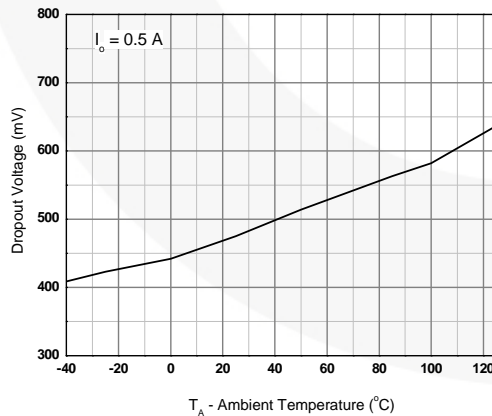
**Figure 4. Quiescent vs. Temperature**



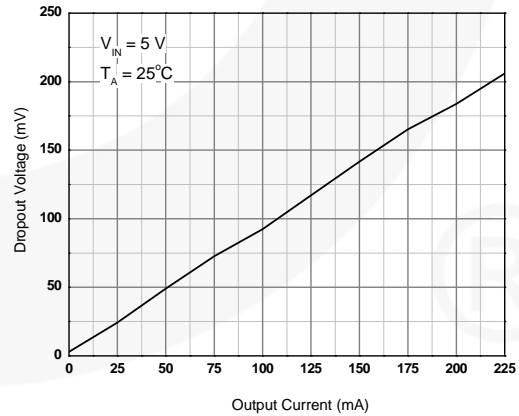
**Figure 5. Peak Output Current**



**Figure 6. Output Voltage vs. Temperature**



**Figure 7. Dropout Voltage vs. Temperature**



**Figure 8. Dropout Voltage vs. Output Current**

Typical Performance Characteristics (Continued)

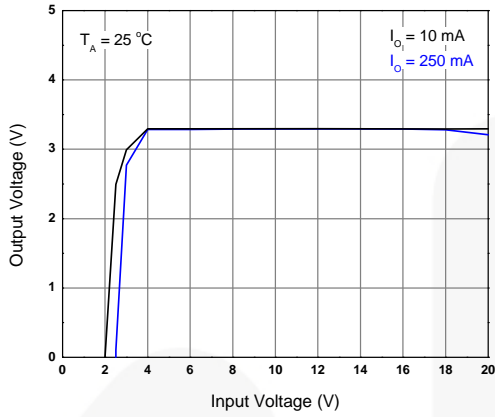


Figure 9. Output Voltage vs. Input Voltage

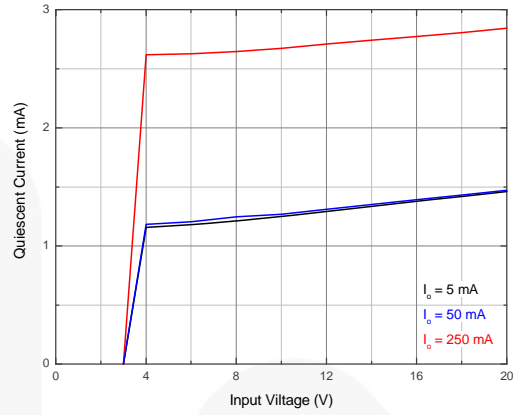


Figure 10. Quiescent Current vs. Input Voltage

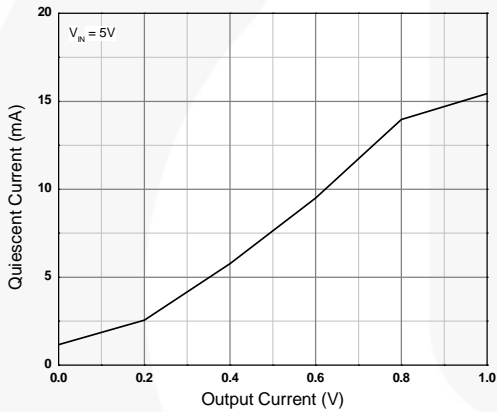


Figure 11. Quiescent Current vs. Output Current

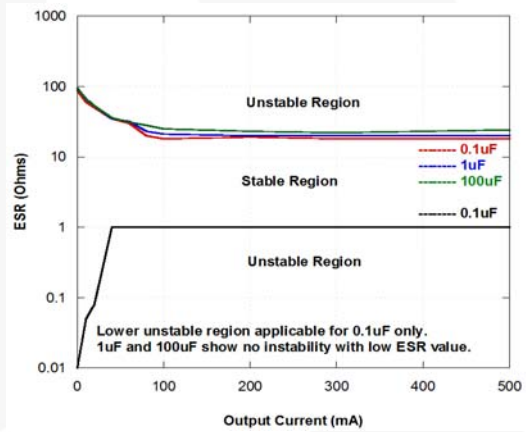


Figure 12. Output Stability vs. Output Capacitor Change

Physical Dimensions

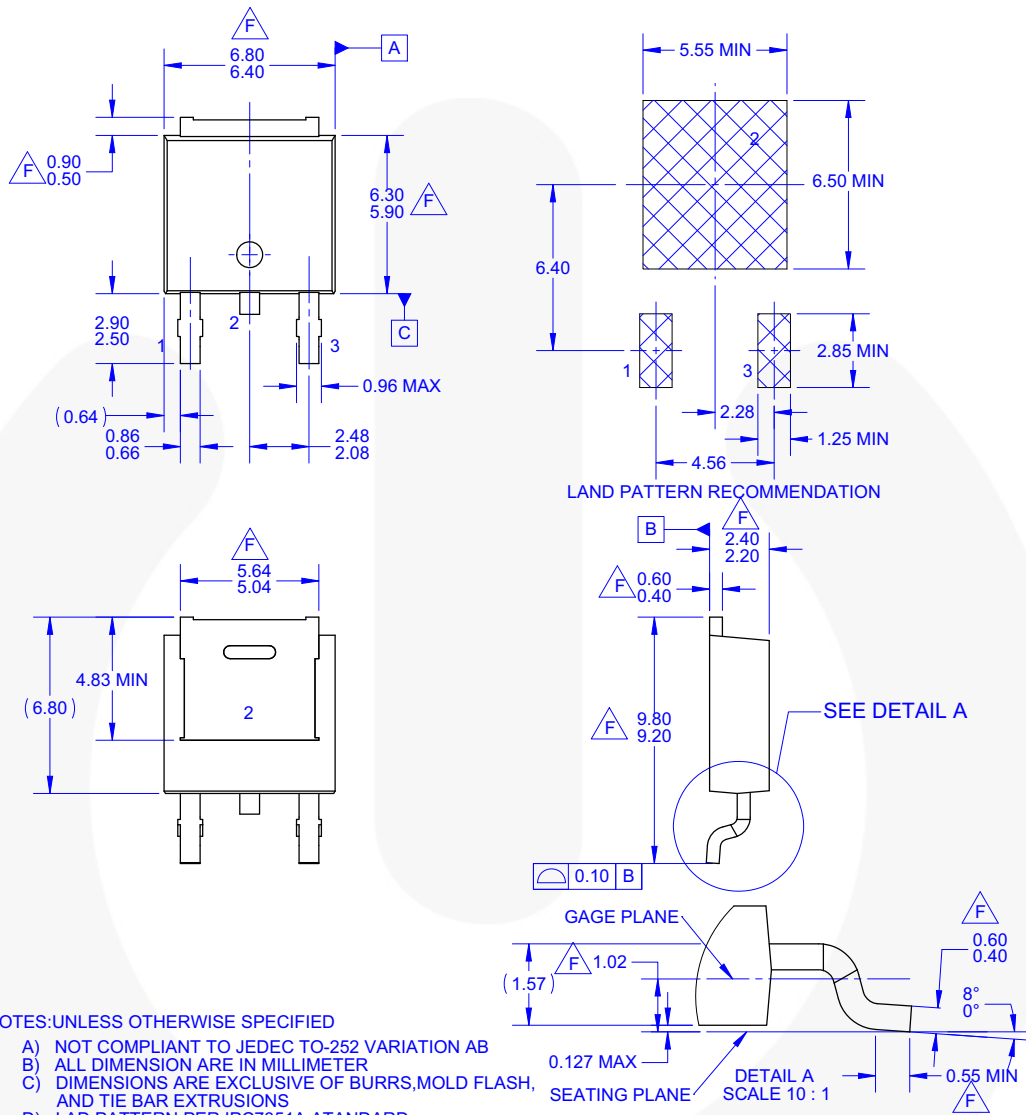


Figure 13. 3-Lead, TO-252, JEDEC TO-252 VAR. AB, SURFACE MOUNT (DPAK)



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