FAIRCHILD
SEMICONDUCTOR®

June 2013

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.
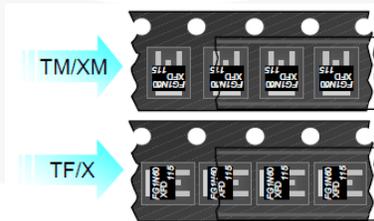
DPAK

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

Ordering Information

Part Number	Operating Temperature Range	Top Mark	Package	Packing Method
KA78RM33RTF	-25 ~ +125°C	KA78RM33	DPAK	Tape and Reel
KA78RM33RTM		KA78RM33	DPAK	Tape and Reel

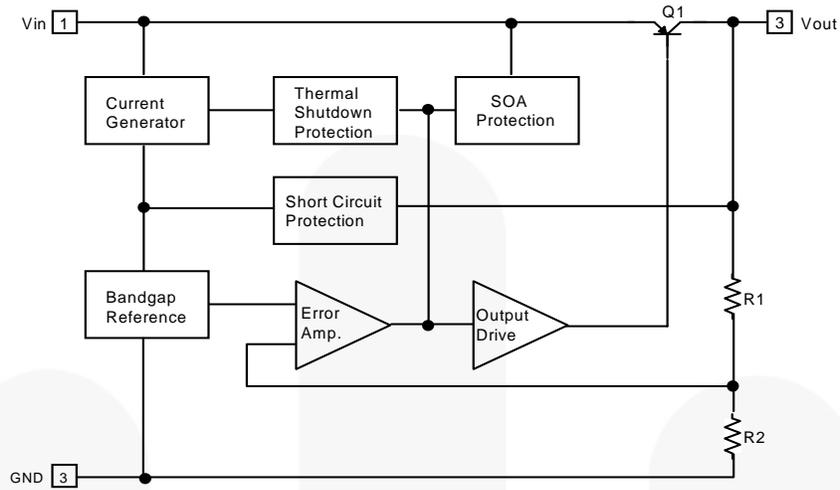* Refer to below unit orientation figure for TM / TF suffix packing.
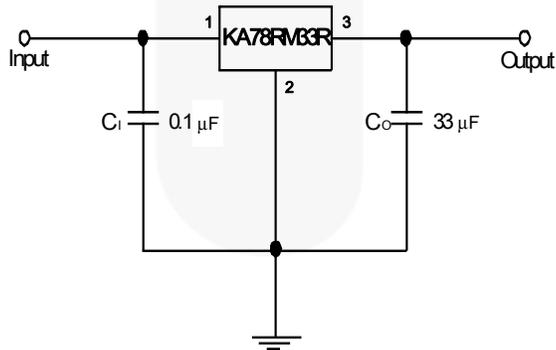
TM/XM

TF/X

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°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	°C/W
P_D	Power Dissipation	Interally limited		
T_J	Junction Temperature	150		°C
T_{OPR}	Operating Temperature	-25 ~ +125		°C

Electrical Characteristics

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

| Symbol	Parameter	Conditions	Min.	Typ.	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
I_Q	Quiescent Current	I_O = 0 A		5.0	10	mA
I_{PK}	Peak Current	V_{IN} = 5 V	0.5	1.0		A
V_N	Output Noise Voltage	10 Hz < f < 100 kHz		50		μV_{RMS}
$\Delta V_{OUT}/\Delta T$	Temperature Coefficient of Output Voltage	-25°C < T_J < 125°C, I_O = 100 mA		-0.2		mV /°C

Typical Performance Characteristics
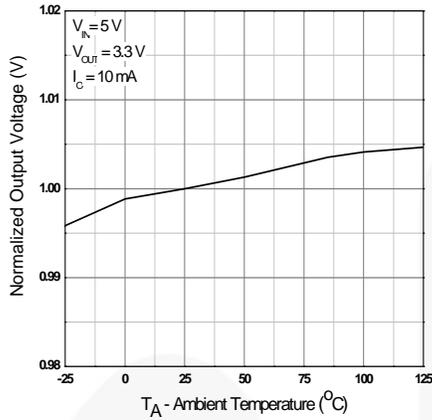
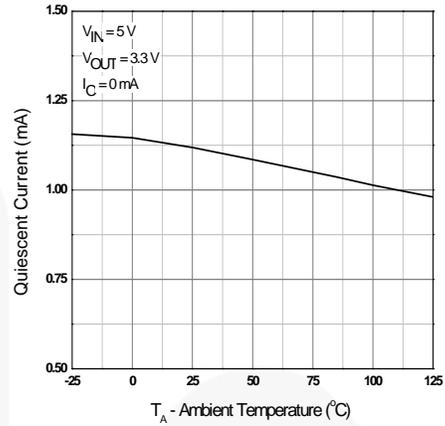**Figure 3. Normalized Output Voltage**

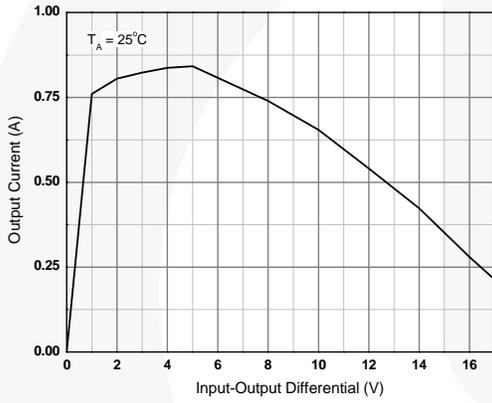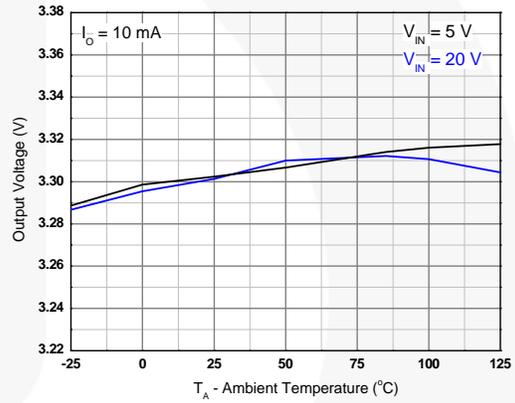**Figure 4. Quiescent vs. Temperature**

Figure 5. Peak Output Current

Figure 6. Output Voltage vs. Temperature
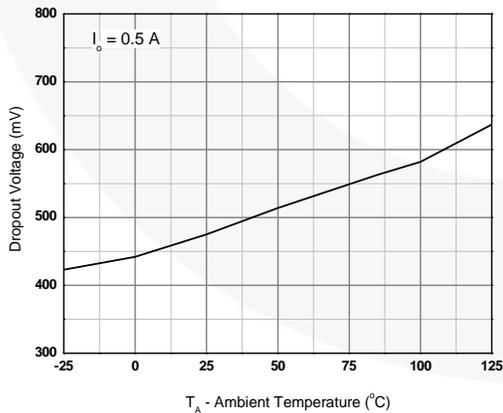
Figure 7. Dropout Voltage vs. Temperature
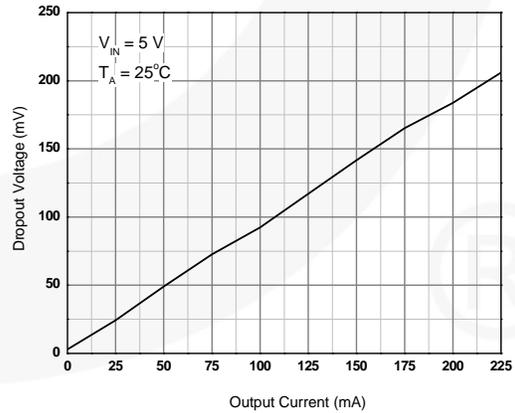
Figure 8. Dropout Voltage vs. Output Current

www.fairchildsemi.com

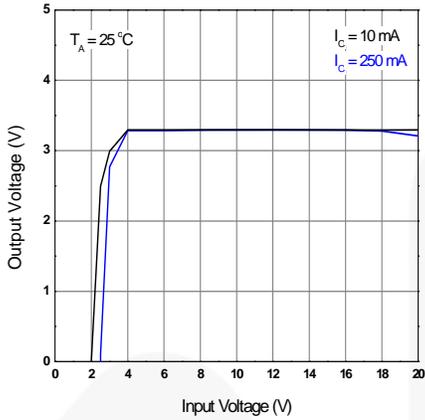## Typical Performance Characteristics (Continued)
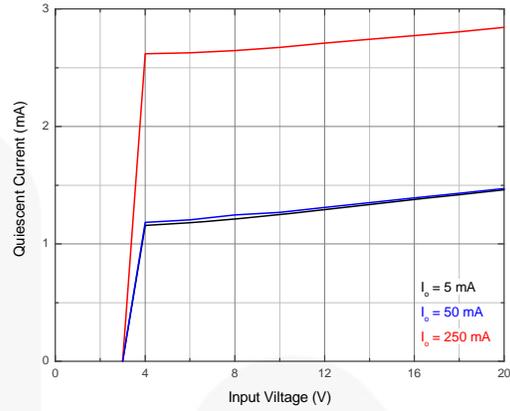

Figure 9. Output Voltage vs. Input Voltage
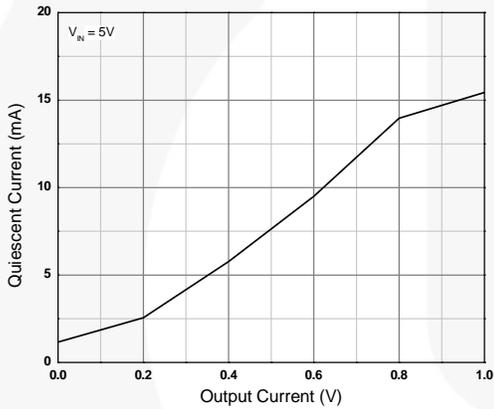

Figure 10. Quiescent Current vs. Input Voltage

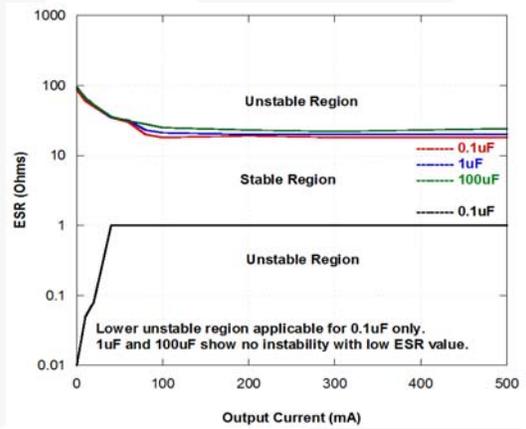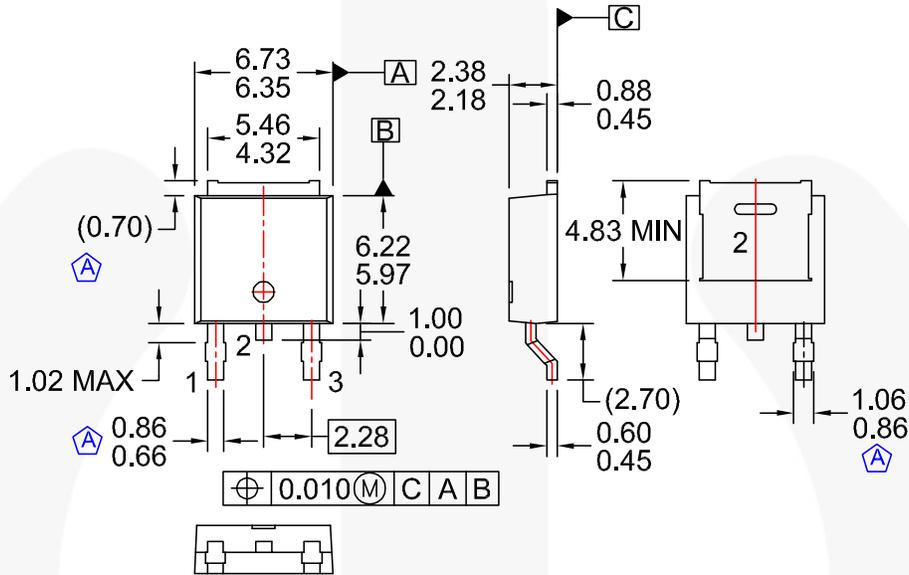**Figure 11. Quiescent Current vs. Output Current**

Figure 12. Output Stability vs. Output Capacitor Change

Physical Dimensions

DPAK

NOTES: UNLESS OTHERWISE SPECIFIED
A) CONFORMS TO JEDEC TO-252 VARIATION AB
   EXCEPT WHERE NOTED
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DRAWING CONFORMS TO ASME Y14.5M-1994
D) DIMENSIONS ARE EXCLUSIVE OF BURRS,
   MOLD FLASH, AND TIE BAR EXTRUSIONS.
E) FORMERLY NAMED BD1733
F) DRAWING FILE NAME: MKT-TO252D03REV1

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

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:
http://www.fairchildsemi.com/packaging/.

For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:
http://www.fairchildsemi.com/packing_dwg/PKG-TO252D03.pdf.

FAIRCHILD
SEMICONDUCTOR®

TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

2Cool™	FPS™		Sync-Lock™
AccuPower™	F-PFS™	®	**SYSTEM GENERAL®***
AX-CAP®*	FRFET®	PowerTrench®	
BitSiC™	Global Power Resource℠	PowerXS™	TinyBoost™
Build it Now™	GreenBridge™	Programmable Active Droop™	TinyBuck™
CorePLUS™	Green FPS™	QFET®	TinyCalc™
CorePOWER™	Green FPS™ e-Series™	QS™	TinyLogic®
CROSSVOLT™	G*max*™	Quiet Series™	TINYOPTO™
CTL™	GTO™	RapidConfigure™	TinyPower™
Current Transfer Logic™	IntelliMAX™	™	TinyPWM™
DEUXPEED®	ISOPLANAR™	Saving our world, 1mW/W/kW at a time™	TinyWire™
Dual Cool™	Making Small Speakers Sound Louder and Better™	SignalWise™	TranSiC™
EcoSPARK®		SmartMax™	TriFault Detect™
EfficientMax™	MegaBuck™	SMART START™	TRUECURRENT®*
ESBC™	MICROCOUPLER™	Solutions for Your Success™	µSerDes™
F®	MicroFET™	SPM®	
Fairchild®	MicroPak™	STEALTH™	**µ SerDes**™
Fairchild Semiconductor®	MicroPak2™	SuperFET®	UHC®
FACT Quiet Series™	MillerDrive™	SuperSOT™-3	Ultra FRFET™
FACT®	MotionMax™	SuperSOT™-6	UniFET™
FAST®	mWSaver™	SuperSOT™-8	VCX™
FastvCore™	OptoHiT™	SupreMOS®	VisualMax™
FETBench™	OPTOLOGIC®	SyncFET™	VoltagePlus™
	OPTOPLANAR®		XS™

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER
FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY
FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.

2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ANTI-COUNTERFEITING POLICY
Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I64

www.fairchildsemi.com