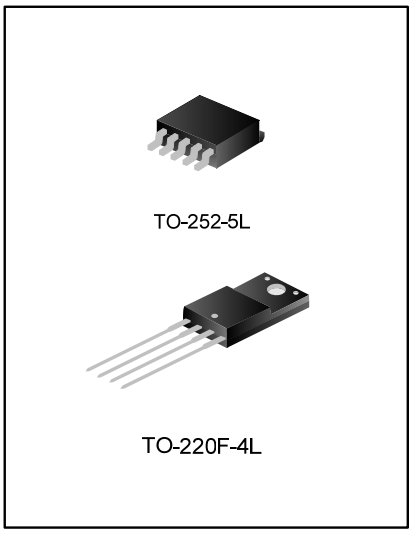
1A LDO VOLTAGE REGULATOR

DESCRIPTION

The SA78RXX is a positive low voltage dropout regulator, the voltage dropout is below 0.5V at 1A.

The SA78RXX provides two versions: fixed and adjustable versions. The SA78RXX is available in fixed output voltages 2.5V, 3.3V, 5V, 8V, 9V, 12V and 15V. The SA78RXX offers some key features include thermal shutdown, peak current protection, overvoltage protection and output disable function. The SA78RXX is an excellent choice for use in various electronic equipments.



FEATURES

* Available fixed version 2.5V, 3.3V, 5V, 8V, 9V, 12V,15V and adjustable version
* Low Dropout Voltage: 150mV at 1A output current
* Current limiting: 2A
* Overvoltage protection: 40V
* Built-in output disable function
* TO-220 full-mold package (4pin) and TO-252-5L package(5pin)
* Overcurrent protection, thermal shutdown
* Overvoltage protection, short circuit protection

APPLICATIONS

* High Efficiency Linear Regulators
* Post Regulators for Switching Supplies
* Battery Charger
* Microprocessor Supply
* Desktop PCs, RISC and Embedded Processors Supply

ORDERING INFORMATION (Tamb=-20~+80°C)

SA78R □□ F / D □□

Device

00: adjustable output
25: Fixed output 2.5V
33: Fixed output 3.3V
05: Fixed output 5V
08: Fixed output 8V
09: Fixed output 9V
12: Fixed output 12V
15: Fixed output 15V

F: Package: TO-220F-4L
D: Package: TO-252-5L

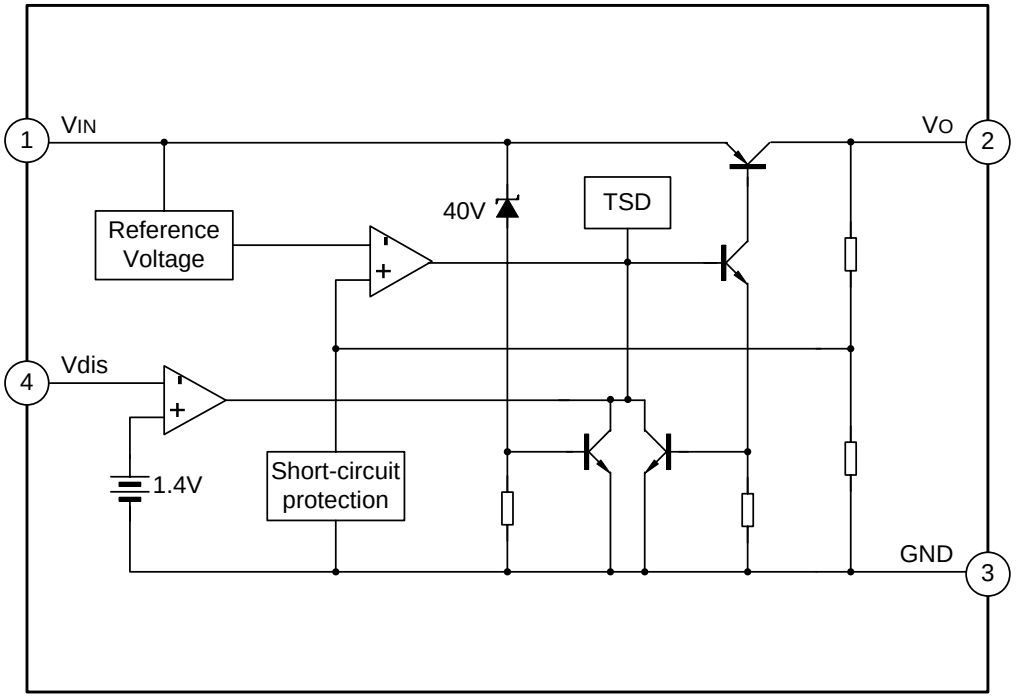
Blank: Pb free

TR: Tape & Reel
Blank: Tube

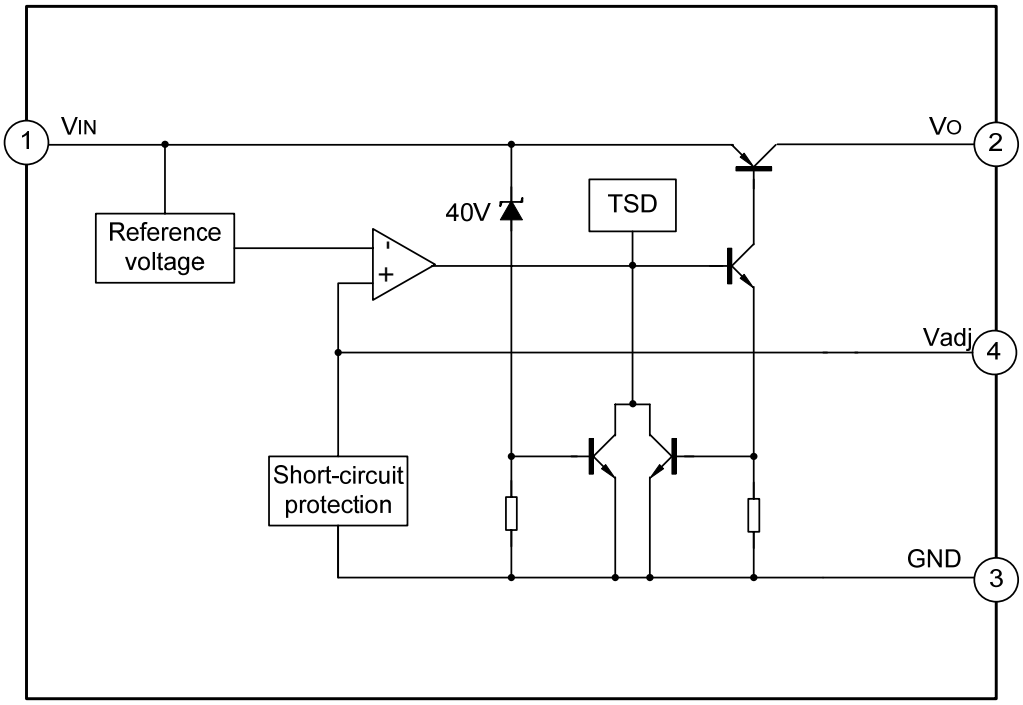
Part No.	package	Marking	Material	Packing Type
SA78R00F	TO-220F-4L	SA78R00F	Pb free	Tube
SA78R25F		SA78R25F	Pb free	Tube
SA78R33F		SA78R33F	Pb free	Tube
SA78R05F		SA78R05F	Pb free	Tube
SA78R08F		SA78R08F	Pb free	Tube
SA78R09F		SA78R09F	Pb free	Tube
SA78R12F		SA78R12F	Pb free	Tube
SA78R15F		SA78R15F	Pb free	Tube
SA78R25DTR	TO-252-5L	SA78R25D	Pb free	Tape & Reel
SA78R33DTR		SA78R33D	Pb free	Tape & Reel
SA78R05DTR		SA78R05D	Pb free	Tape & Reel
SA78R08DTR		SA78R08D	Pb free	Tape & Reel
SA78R09DTR		SA78R09D	Pb free	Tape & Reel
SA78R12DTR		SA78R12D	Pb free	Tape & Reel
SA78R15DTR		SA78R15D	Pb free	Tape & Reel
SA78R25D	TO-252-5L	SA78R25D	Pb free	Tube
SA78R33D		SA78R33D	Pb free	Tube
SA78R05D		SA78R05D	Pb free	Tube
SA78R08D		SA78R08D	Pb free	Tube
SA78R09D		SA78R09D	Pb free	Tube
SA78R12D		SA78R12D	Pb free	Tube
SA78R15D		SA78R15D	Pb free	Tube

BLOCK DIAGRAM

SA78RXXF

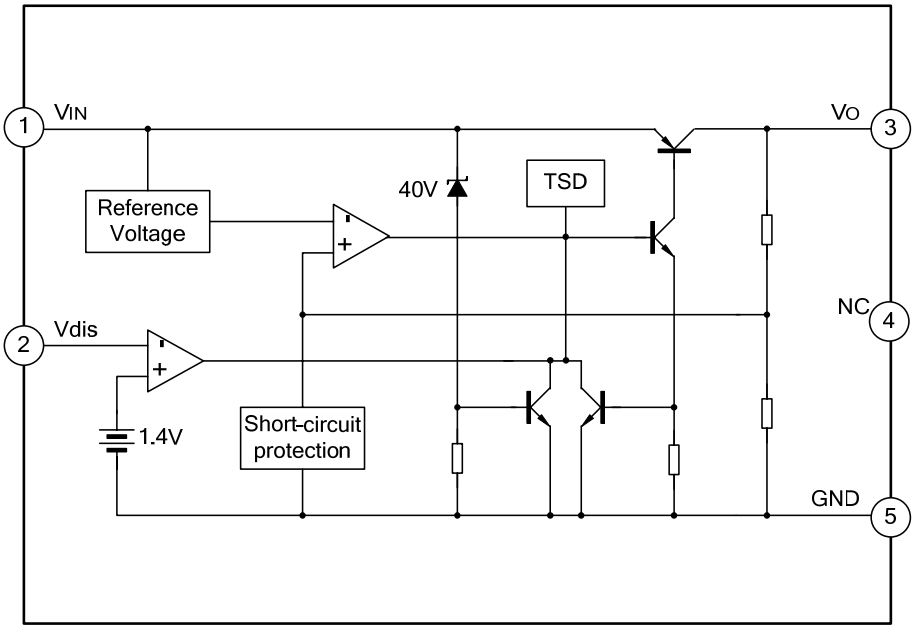


Fixed mode



Adjustable mode

SA78RXXD

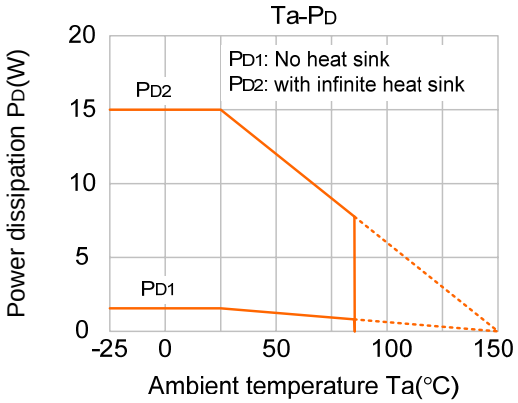


Fixed mode

ABOSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Ratings	Unit
Input Supply Voltage	VIN	35	V
Disable Voltage	Vdis	35	V
Output Current	Io	1.0	A
Power Dissipation 1 (No Heatsink)	Pd1	1.5	W
Power Dissipation 2 (With Heatsink)	Pd2	15	W
Operating Junction Temperature	TJ	150	°C
Operating Temperature Range	Topr	-20~+85	°C
Thermal Resistance, Junction-To Case	R θ jc	4.3	°C/W
Thermal Resistance, Junction-To Air	R θ ja	48.8	°C/W

Note: Do not exceed PD and SOA (Safe Operating Area).



RECOMMENDED OPERATING CONDITIONS

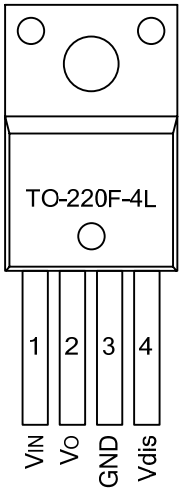
Characteristics	Symbol	Ratings		Unit
Input Voltage	V_{IN}	SA78R25	3.3	V
		SA78R33	5	
		SA78R05	7	
		SA78R08	10	
		SA78R09	11	
		SA78R12	15	
		SA78R15	20	
Operating Junction Temperature Range	T_j	-20~+80		°C

ELECTRICAL CHARACTERISTICS(Io=0.5A, Ta =25°C, unless otherwise specified.)

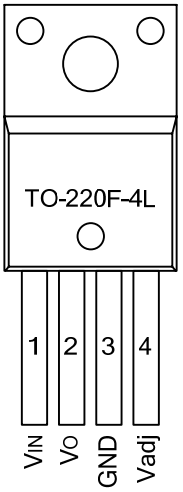
Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	SA78R25	2.44	2.5	2.56	V
		SA78R33	3.22	3.3	3.38	
		SA78R05	4.88	5	5.12	
		SA78R08	7.8	8	8.2	
		SA78R09	8.78	9	9.22	
		SA78R12	11.7	12	12.3	
		SA78R15	14.6	15	15.4	
Line Regulation	Rline	SA78R25 : V_{IN}=4V to 10V		0.5	2.5	%
		SA78R33 : V_{IN}=4V to 10V				
		SA78R05 : V_{IN} =6V to 12V				
		SA78R08 : V_{IN} =9V to 25V				
		SA78R09 : V_{IN} =10V to 25V				
		SA78R12 : V_{IN} =13V to 29V				
		SA78R15 : V_{IN} =16V to 30V				
Load Regulation	R_{LOAD}	5mA < Io < 1A		0.1	2.0	%
Dropout Voltage	V_{DROP}	I_{OUT}=1A		0.15	0.5	V
Quiescent Current	I_Q	I_O=0A;V_{DIS}=0.4V		3	10	mA
Ripple Rejection	PSRR		45	55		dB
Disable Voltage High	V_{DISH}	Output active	2.0			V
Disable Voltage Low	V_{DISL}	Output disabled			0.8	V
Disable Bias Current High	I_{DISH}	V_{DIS} =2.7V			20	μA
Disable Bias Current Low	I_{DISL}	V_{DIS}=0.4V			-0.4	mA
Reference Voltage	Vref	SA78R00	1.24	1.27	1.30	V

PIN CONFIGURATION

SA78RXXF

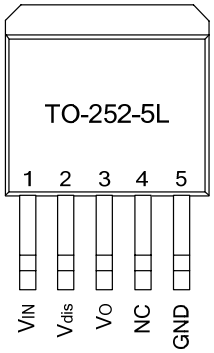


Fixed mode



Adjustable mode

SA78RXXD



Fixed mode

PIN DESCRIPTION

SA78RXXF Fixed mode

Pin No.	Pin name	I/O	Functions
1	V_{IN}	I	Input supply voltage
2	V_O	O	Output voltage
3	GND	--	Ground
4	Vdis	I	Disable voltage

SA78RXXF adjustable mode

Pin No.	Pin name	I/O	Functions
1	V_{IN}	I	Input supply voltage
2	V_O	O	Output voltage
3	GND	--	Ground
4	Vadj	I	Adjustable voltage

SA78RXXD Fixed mode

SA78RXXD	Pin name	I/O	Functions
1	V_{IN}	I	Input supply voltage
2	Vdis	I	Disable voltage
3	V_O	O	Output voltage
4	NC		Not connect
5	GND	--	Ground

FUNCTION DESCRIPTION

Output disable function

The SA78RXX comes with a Vdis pin that allows the regulator to be disabled. Forcing the Vdis pin low disables the regulator. Forcing the Vdis pin high enables the output voltage.

Input Capacitor

The SA78RXX requires a well-bypassed input capacitor for optimal performance. An input capacitor is required if regulator is located at an appreciable distance from power supply filter.

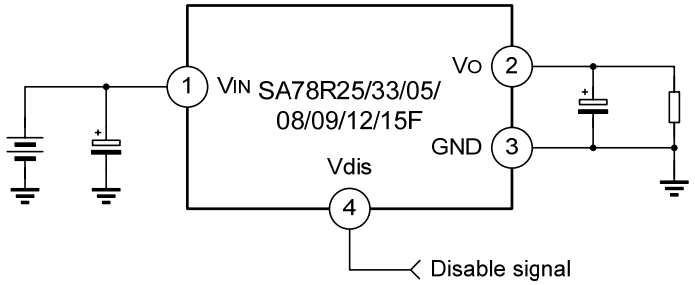
Output Capacitor

The SA78RXX requires an output capacitor of 47μF or based on the real application to maintain stability.

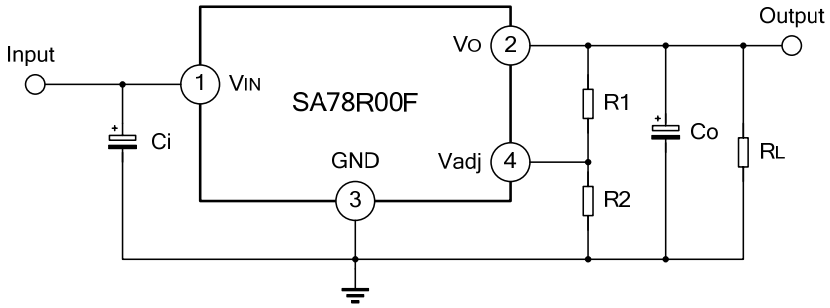
TYPICAL APPLICATION CIRCUIT

SA78RXXF

Fixed mode



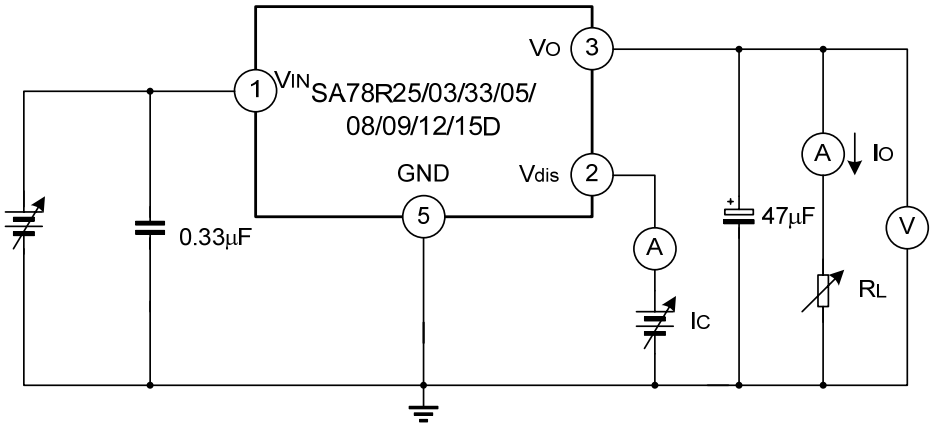
Adjustable mode



$$Vo=1.27 \times \frac{R1+R2}{R2}$$

SA78RXXD

Fixed mode



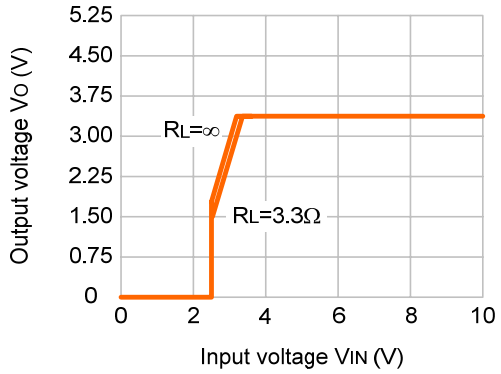
Note:

1. Co ＝47μF or based on the real application
2. The circuit and parameters are reference only, please set the parameters of the real application circuit based on the real test.

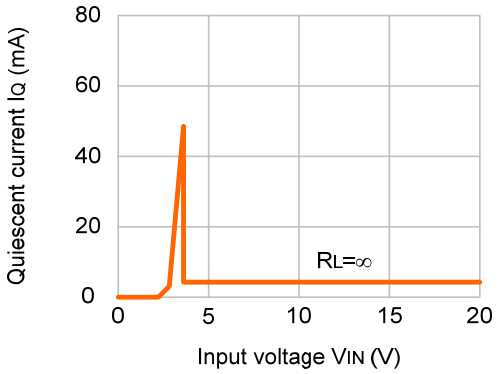
TYPICAL CHARACTERISTICS CURVES

SA78R33

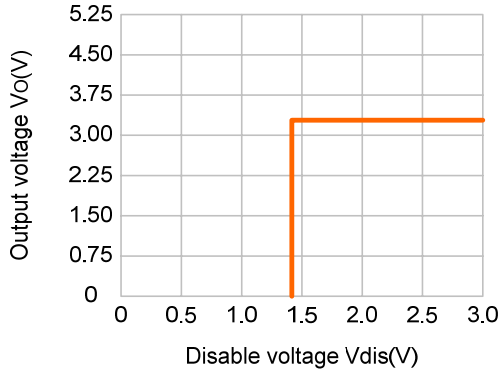
Output voltage vs. input voltage



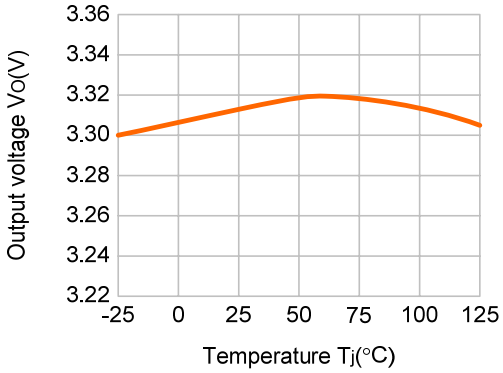
Quiescent current vs. input voltage



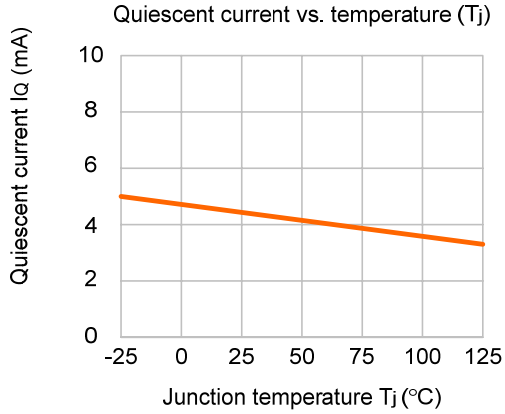
Output voltage vs. disable voltage



Output voltage vs. temperature(Tj)

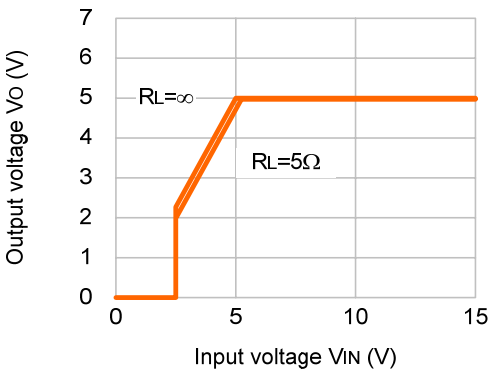


Quiescent current vs. temperature (Tj)

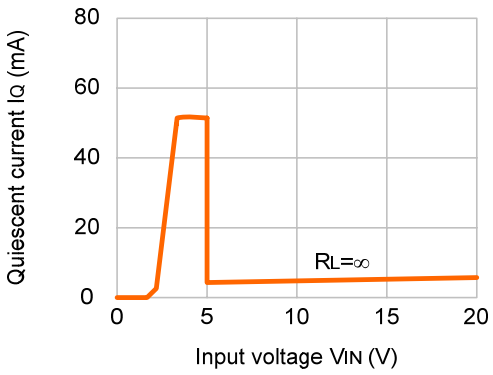


SA78R05

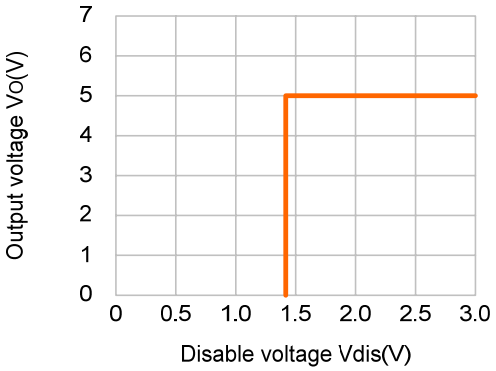
Output voltage vs. input voltage



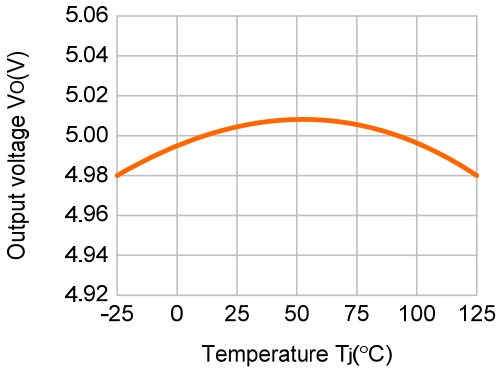
Quiescent current vs. input voltage



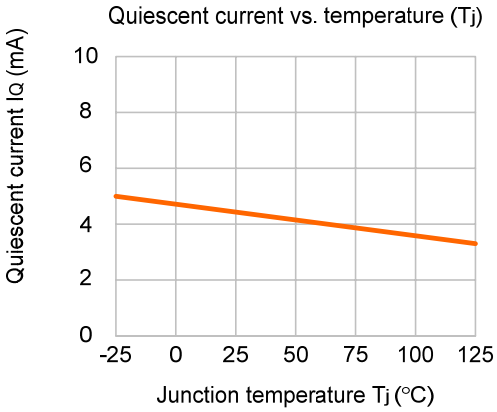
Output voltage vs. disable voltage



Output voltage vs. temperature(Tj)

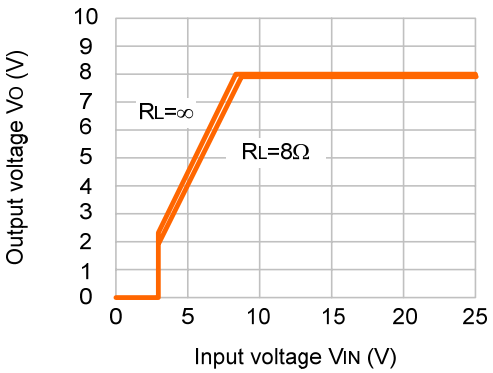


Quiescent current vs. temperature (Tj)

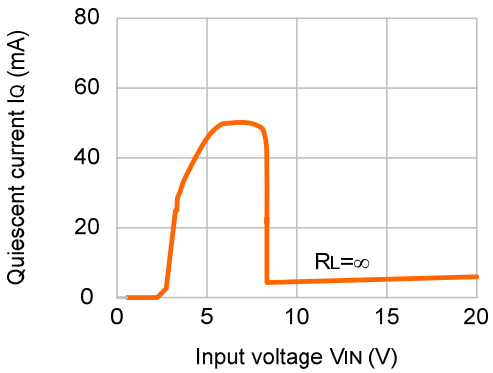


SA78R08

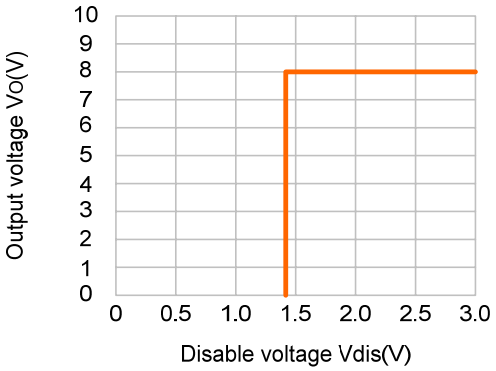
Output voltage vs. input voltage



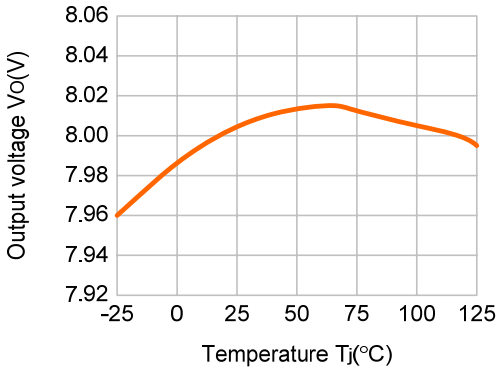
Quiescent current vs. input voltage



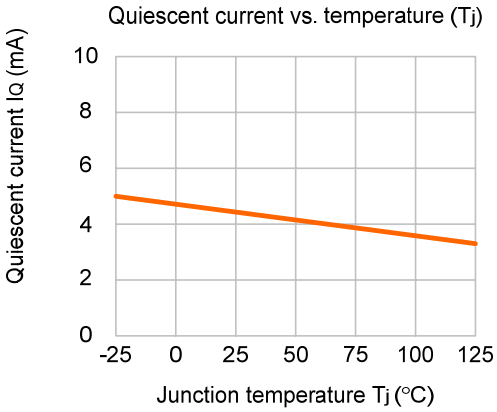
Output voltage vs. disable voltage



Output voltage vs. temperature(Tj)

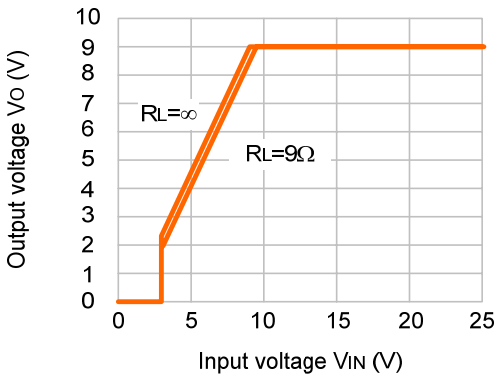


Quiescent current vs. temperature (Tj)

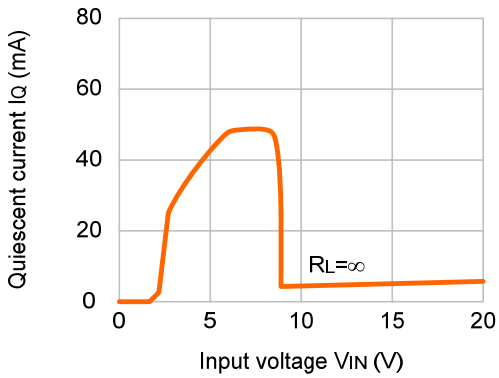


SA78R09

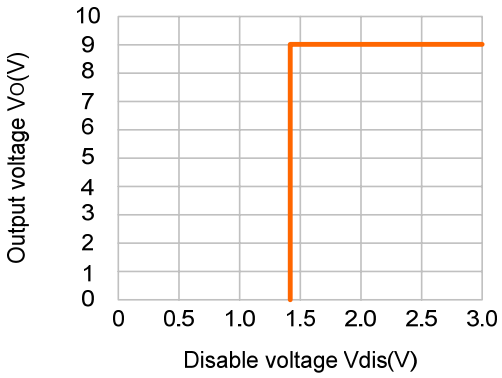
Output voltage vs. input voltage



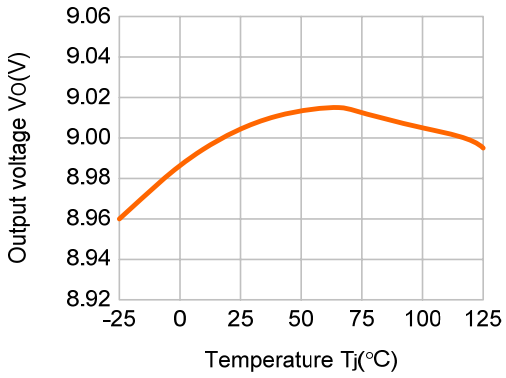
Quiescent current vs. input voltage



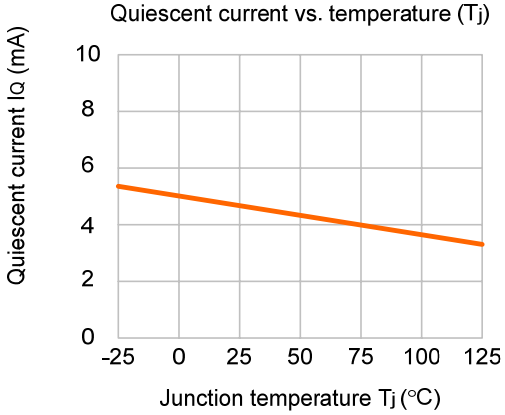
Output voltage vs. disable voltage



Output voltage vs. temperature(Tj)

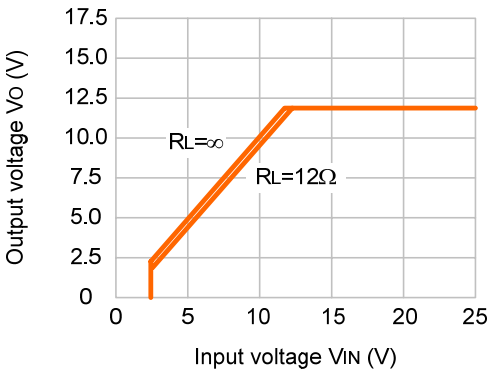


Quiescent current vs. temperature (Tj)

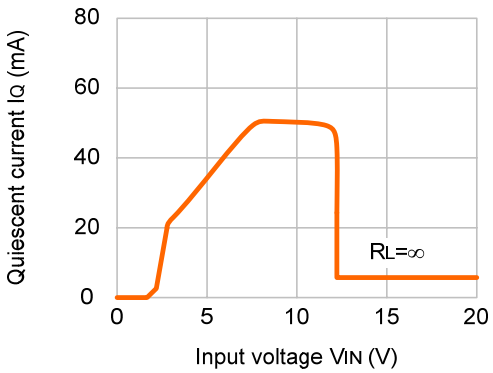


SA78R12

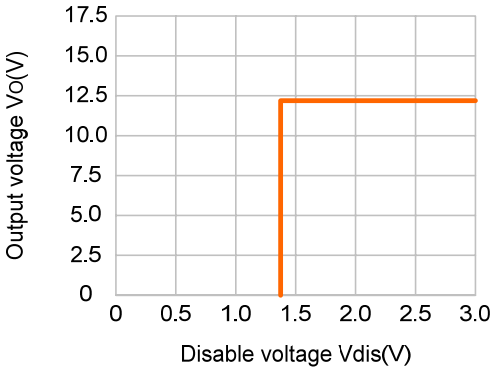
Output voltage vs. input voltage



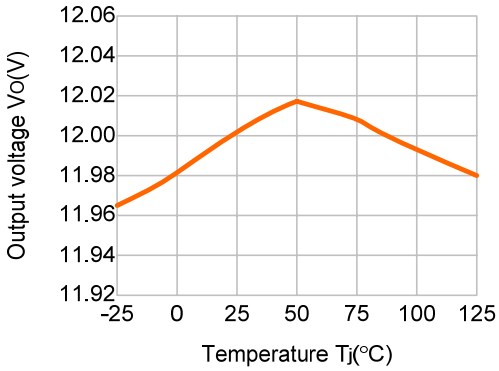
Quiescent current vs. input voltage



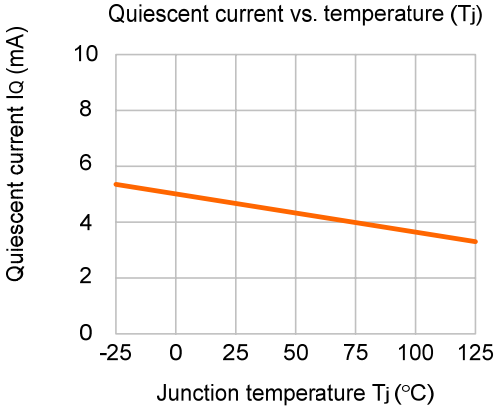
Output voltage vs. disable voltage



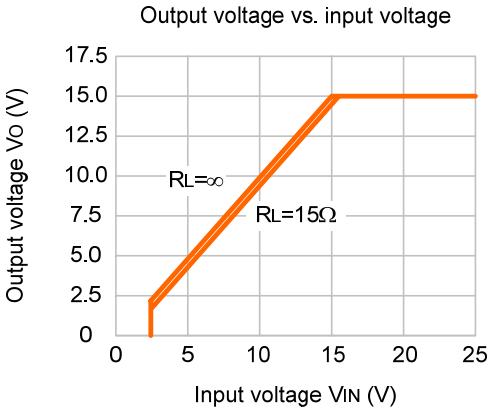
Output voltage vs. temperature(Tj)

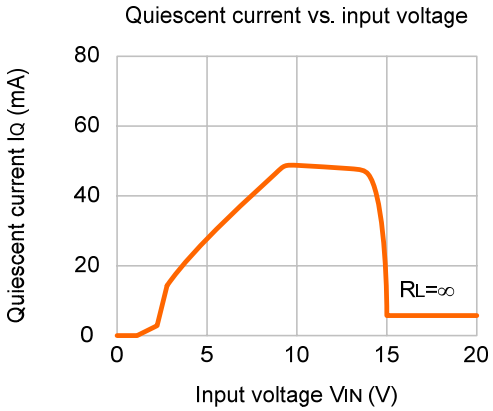


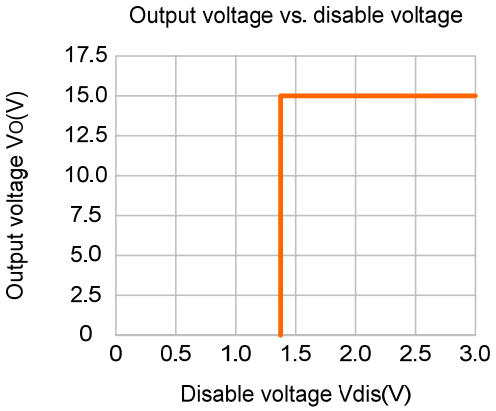
Quiescent current vs. temperature (Tj)

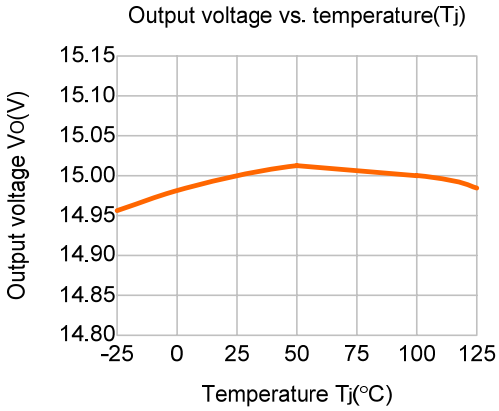


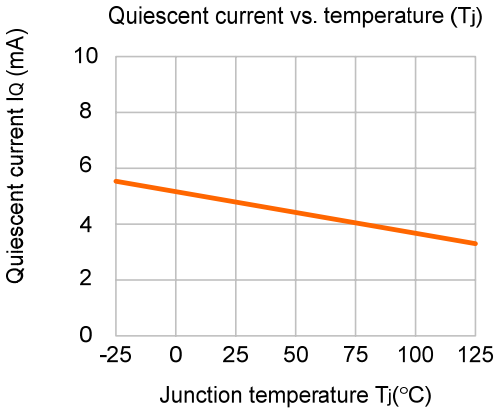
SA78R15


Output voltage vs. input voltage
Output voltage VO (V)
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0
RL=∞
RL=15Ω
0
5
10
15
20
25
Input voltage VIN (V)


Quiescent current vs. input voltage
Quiescent current IQ (mA)
80
60
40
20
0
RL=∞
0
5
10
15
20
Input voltage VIN (V)

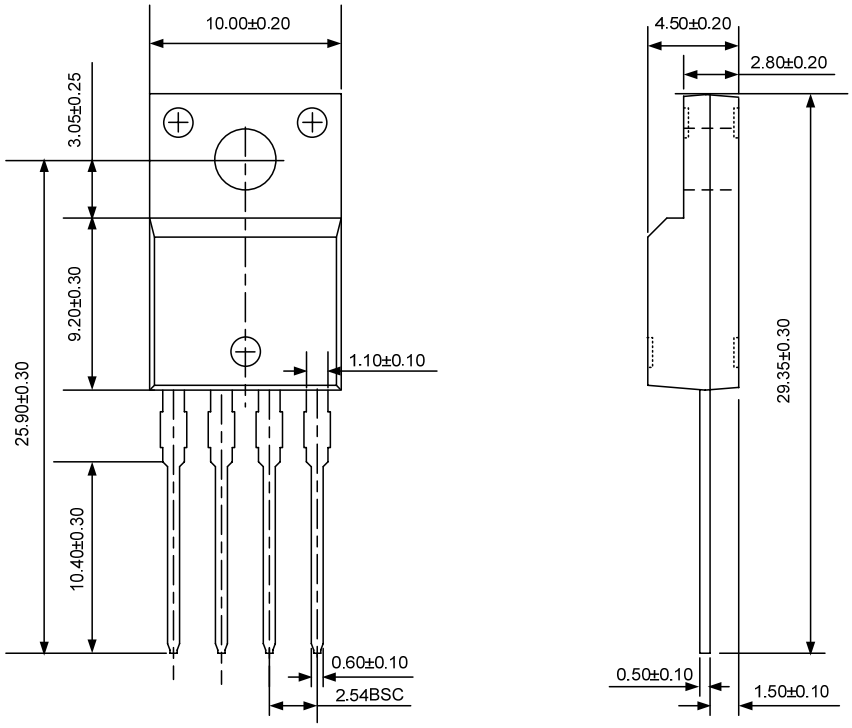

Output voltage vs. disable voltage
Output voltage VO(V)
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0
0
0.5
1.0
1.5
2.0
2.5
3.0
Disable voltage Vdis(V)


Output voltage vs. temperature(Tj)
Output voltage VO(V)
15.15
15.10
15.05
15.00
14.95
14.90
14.85
14.80
-25
0
25
50
75
100
125
Temperature Tj(°C)

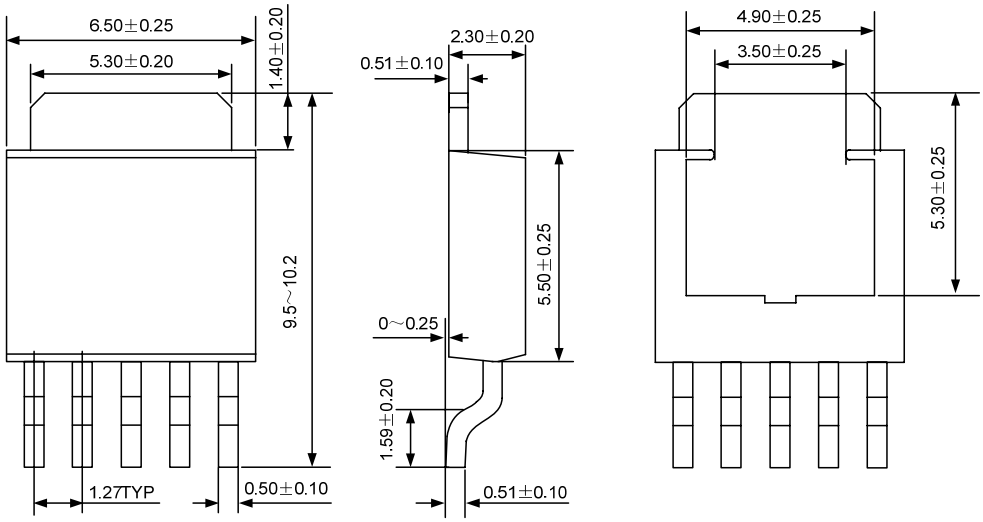

Quiescent current vs. temperature (Tj)
Quiescent current IQ (mA)
10
8
6
4
2
0
-25
0
25
50
75
100
125
Junction temperature Tj(°C)

PACKAGE OUTLINE

TO-220F-4L UNIT: mm



TO-252-5L UNIT: mm



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- **Silan will supply the best possible product for customers!**

ATTACHMENT

Revision History

Date	REV	Description	Page
2010.11.22	1.0	Original	