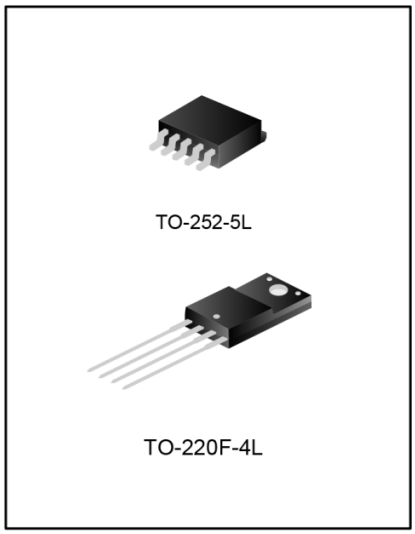
1A LDO Voltage Regulator with Low Quiescent Current

General Description

The GGA78RLXX is a positive voltage regulator with low dropout voltage below 0.5V at 1A.
The GGA78RLXX provides two versions: fixed and adjustable versions. The GGA78RLXX is available in fixed output voltages 5V and 9V. The GGA78RLXX offers some key features including thermal shutdown, peak current protection, overvoltage protection and output disable function. The GGA78RLXX is an excellent choice for use in various electronic equipment.



Features

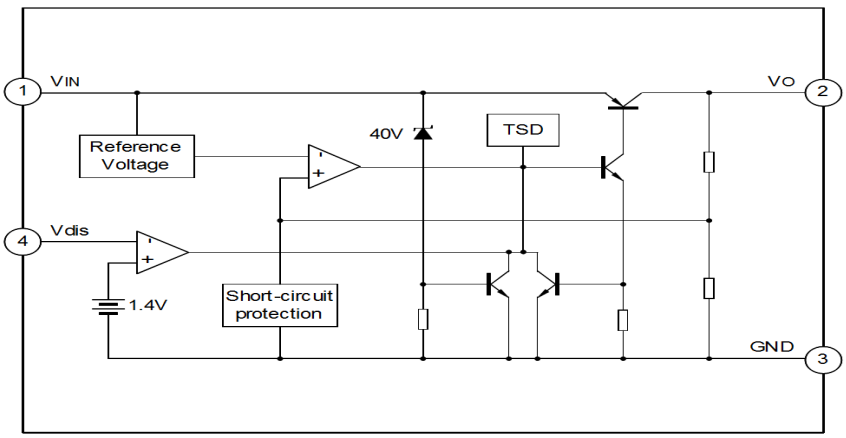
- Available in fixed (5V, 9V) and adjustable versions
- The Low Quiescent Current (V_{dis}=0.4V): I_Q<1μA
- Low Dropout Voltage: 150mV at 1A output current
- Current limiting: 2A
- Overvoltage protection: 40V
- Built-in output disable function
- TO-220 full-mold package (4pin) and TO-252-5L package(5pin)
- Overcurrent protection, thermal shutdown
- Overvoltage protection, short circuit protection

Applications

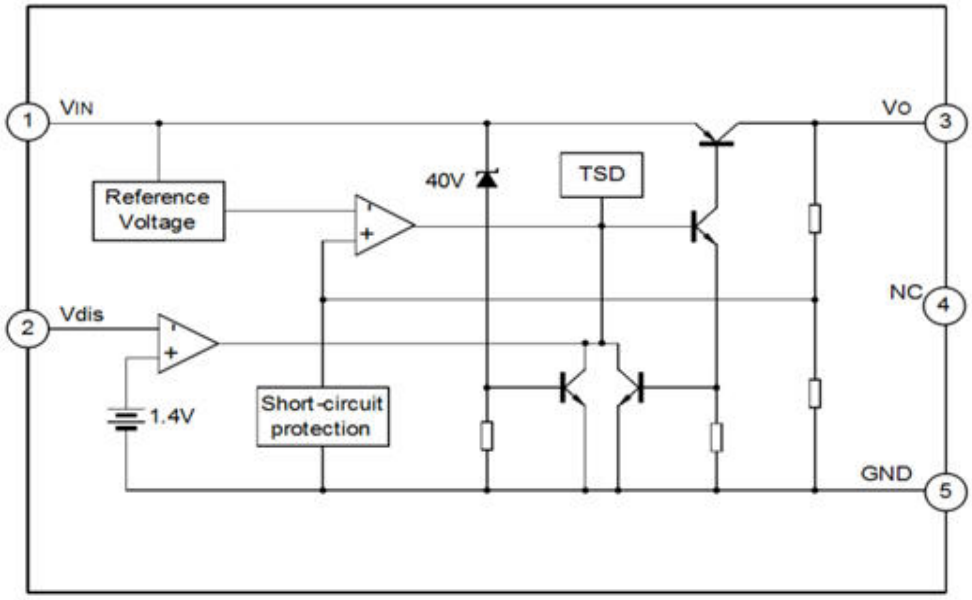
- High Efficiency Linear Regulators
- Post Regulators for Switching Supplies
- Battery Charger
- Microprocessor Supply
- Desktop PCs, RISC and Embedded Processors Supply

Block Diagram

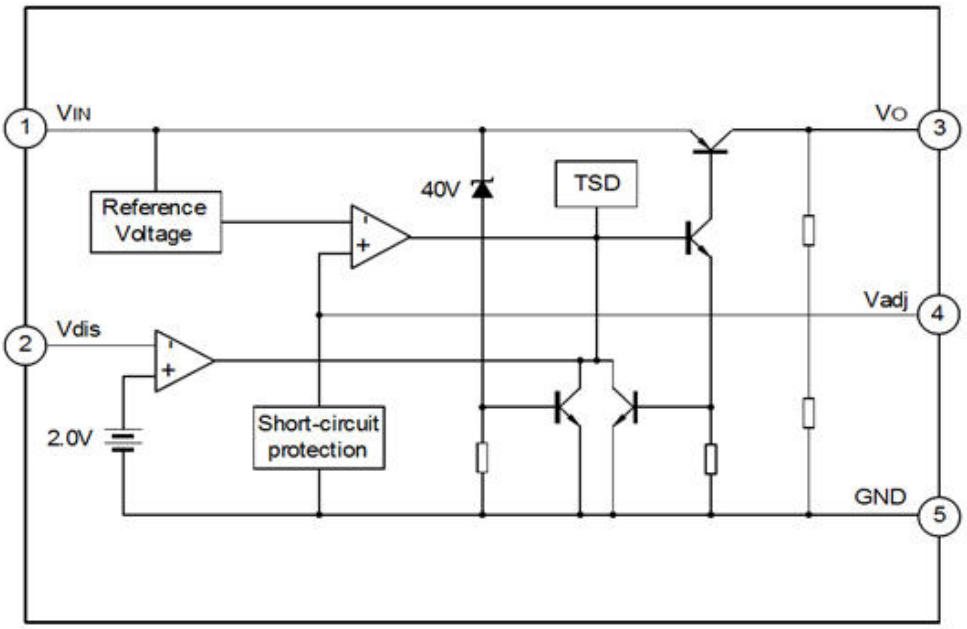
GGA78RL05/09F



GGA78RL05/09D

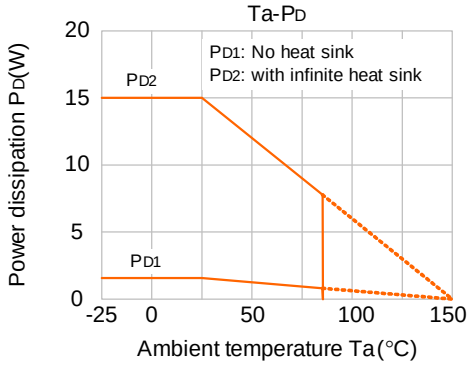


GGA78RL00D



Absolute Maximum Ratings (Operating Temperature Range Applies Unless Otherwise Specified)

Characteristics	Symbol	Ratings	Unit
Input Supply Voltage	V_{IN}	35	V
Disable Voltage	V_{dis}	35	V
Output Current	I_o	1.0	A
Power Dissipation 1 (No Heatsink)	P_{D1}	1.5(note)	W
Power Dissipation 2 (With Heatsink)	P_{D2}	15(note)	W
Junction Temperature Range	T_J	-40~+150	°C
Operating Temperature Range	T_{opr}	-40~+85	°C
Storage Temperature Range	T_{stg}	-55~+150	°C
Thermal Resistance, Junction-To Case	$R_{\theta jc}$	4.3	°C/W
Thermal Resistance, Junction-To Air	$R_{\theta ja}$	48.8	°C/W



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

Recommended Operating Conditions

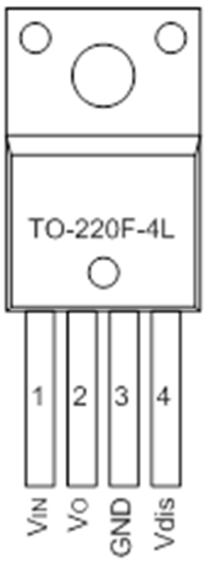
Characteristics	Symbol	Ratings		Unit
Input Voltage	V_{IN}	GGA78RL05	7	V
		GGA78RL09	11	

Electrical Characteristics (Io=0.5A, Ta =25°C, unless otherwise specified.)

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	GGA78RL05	4.88	5	5.12	V
		GGA78RL09	8.78	9	9.22	
Line Regulation	R_{line}	GGA78RL05 : V_{IN} =6V to 12V GGA78RL09 : V_{IN} =10V to 25V	-	0.5	2.5	%
Load Regulation	R_{LOAD}	5mA < Io < 1A	-	0.1	2.0	%
Dropout Voltage	V_{DROP}	I_{OUT}=1A	-	0.15	0.5	V
Operating Current	I_{OPR}	I_O=0A;V_{DIS}=2.7V	-	-	6	mA
Quiescent Current	I_Q	I_O=0A;V_{DIS}=0.4V	-	-	1	μA
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	-	15	30	μA
Disable Bias Current Low	I_{DISL}	V_{DIS}=0.4V	-	-	5	μA
Reference Voltage	V_{ref}	GGA78RL00	1.23	1.25	1.27	V

Pin Configuration

GGA78RL05/09F



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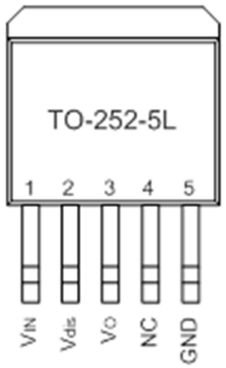

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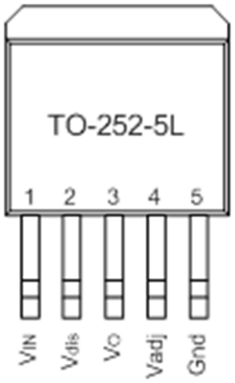


PIN DESCRIPTION

GGA78RL05/09F

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

GGA78RL05/09D

Pin No.	Pin name	I/O	Functions
1	V_{IN}	I	Input supply voltage
2	V_{dis}	I	Disable voltage
3	V_O	O	Output voltage
4	NC		Not connect
5	GND	--	Ground

GGA78RL00D

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

FUNCTION DESCRIPTION

Output disable function

The GGA78RLXX comes with a V_{dis} pin that allows the regulator to be disabled. Forcing the V_{dis} pin low disables the regulator. Forcing the V_{dis} pin high enables the output voltage.

Low Quiescent Current

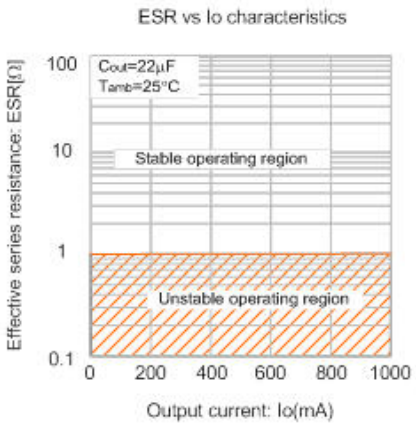
When V_{dis} is low voltage, normal is less than 0.4V, the Quiescent Current is less than 1μA.

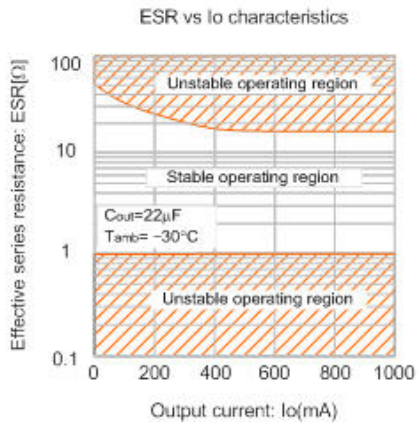
Input Capacitor

The GGA78RLXX 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 GGA78RLXX requires an output capacitor of 47μF or based on the real application to maintain stability.
The capacitance of the capacitor may significantly change due to factors such as temperature changes,making it impossible to completely stop oscillations. Please use a tantalum capacitor or aluminum electrolysis capacitor with favorable characteristics and small internal series resistance(ESR) even at low temperatures. The output fluctuates regardless of whether the ESR is large or small. Please use the IC within the stable operating region while referring to the ESR characteristics reference data shown in the figures below.

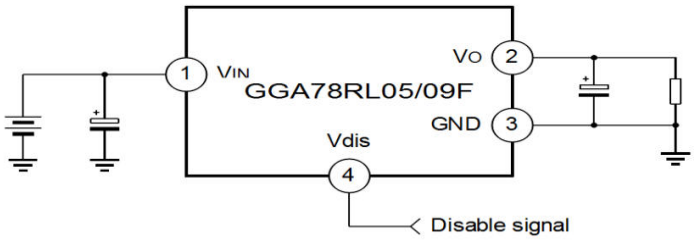




The stable range suggested in the above figure depends on the IC and the resistance load involved, and can vary with the board's wiring impedance, input impedance, and load impedance, etc.

TYPICAL APPLICATION CIRCUITS

GGA78RL05/09F



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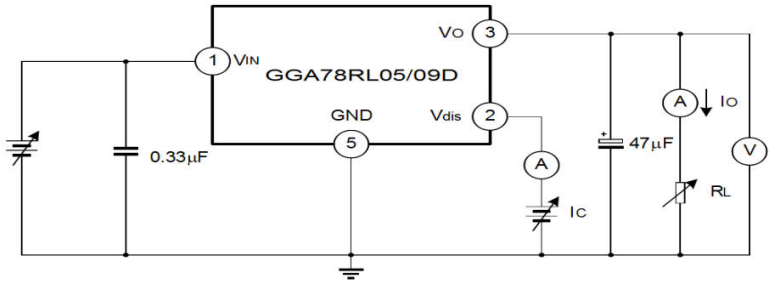
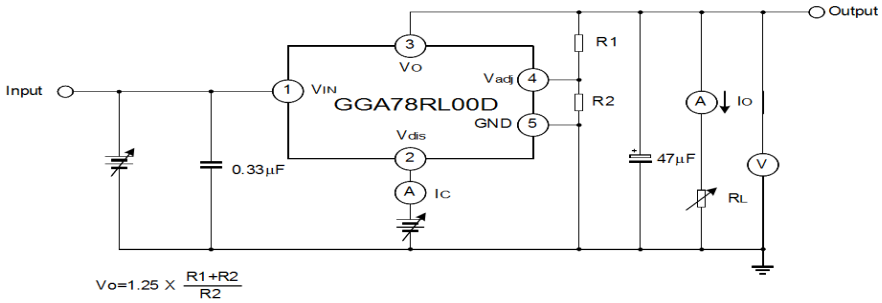


GGA78RL00D

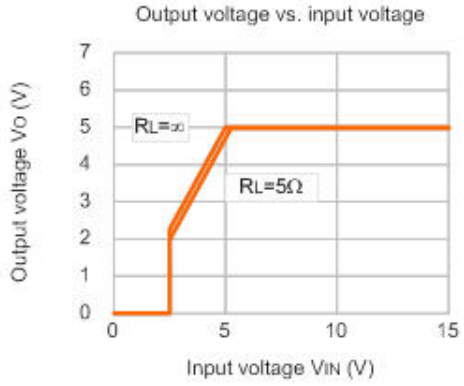


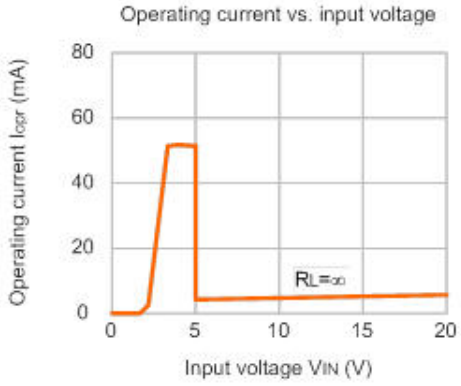
Note:

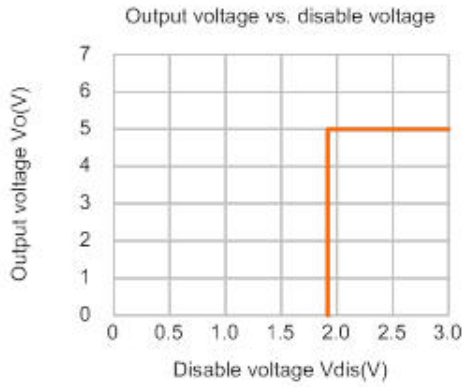
1. Co ＝47μF or based on the real application
2. The circuit and parameters are reference only, please set the parameters of the real application circuit based on the real test.

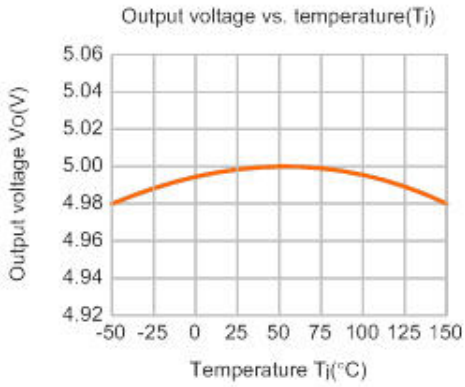
TYPICAL CHARACTERISTICS CURVES

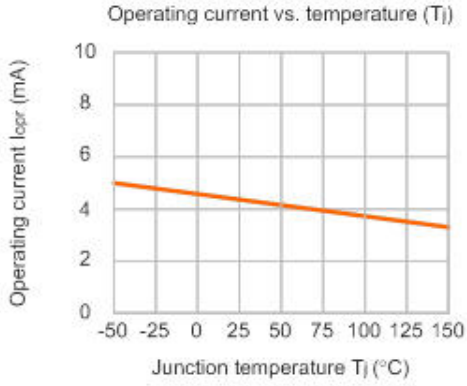
GGA78RL05





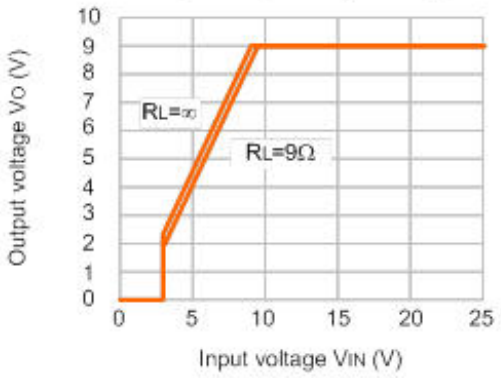




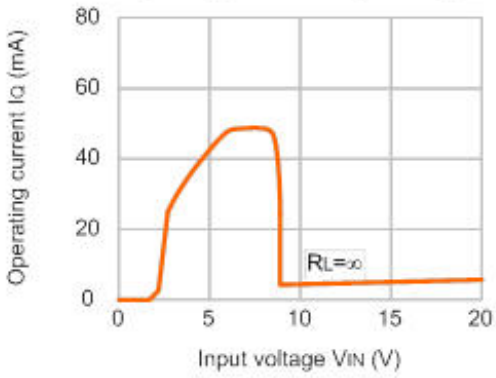


GGA78RL09

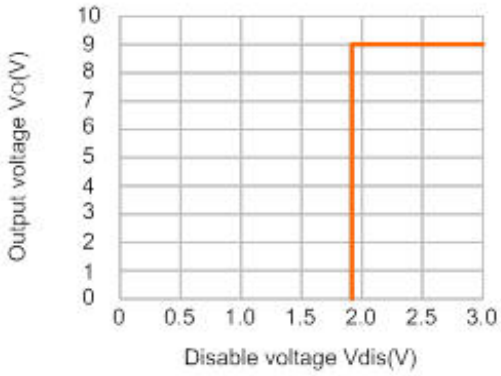
Output voltage vs. input voltage



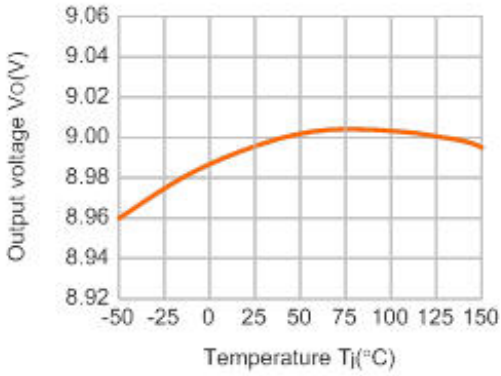
Operating current vs. input voltage



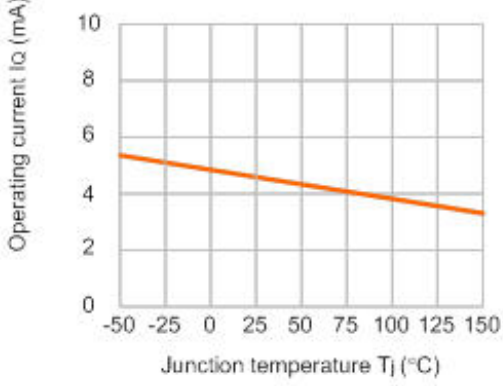
Output voltage vs. disable voltage



Output voltage vs. temperature(Tj)

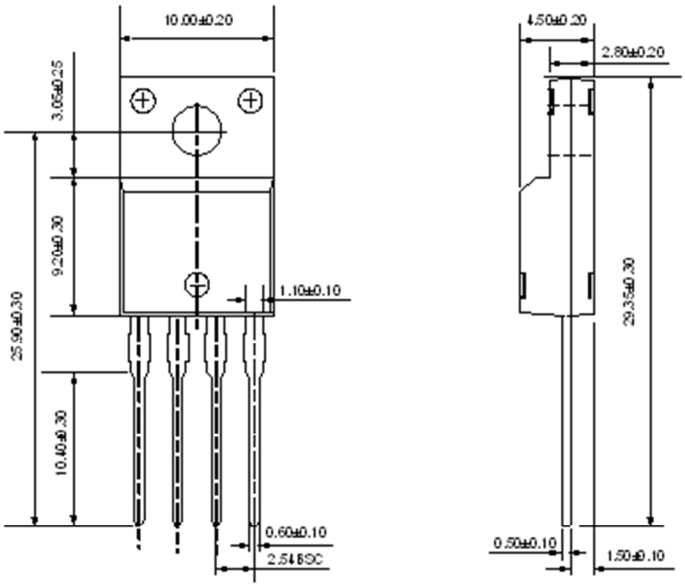


Operating current vs. temperature (Tj)

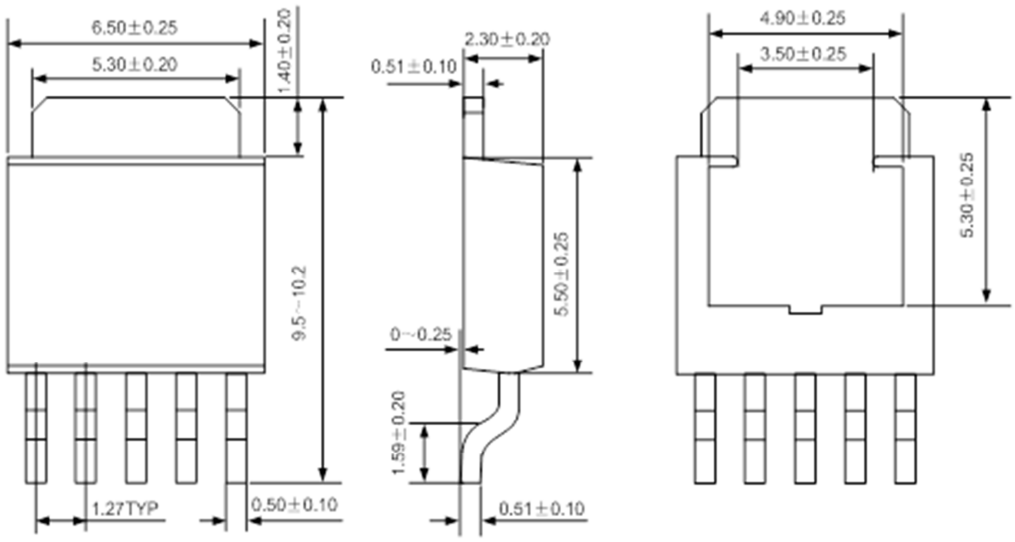


PACKAGE OUTLINE

TO-220F-4L **UNIT: mm**



TO-252-5L **UNIT: mm**



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