ET78M05TC - High Input 800mA LDO

General Description

ET78M05TC is three-terminal positive regulators. One of these regulators can deliver up to 800 mA of output current. The internal limiting and thermal shutdown features of the regulator make them essentially immune to overload. When used as a replacement for a zener diode-resistor combination, an effective improvement in output impedance can be obtained, together with lower quiescent current.

Features

- Up to 800mA Load Current
- Standard Fixed Output Voltage: 5.0V
- Output Transistor Safe Area Protection
- No External Components
- Output Voltage Accuracy: Tolerance ±5% Max
- Package No. and MSL Level:

Part No.	Package	Packing Option	MSL
ET78M05TC	TO-252	Tape and Reel	Level 3

Applications

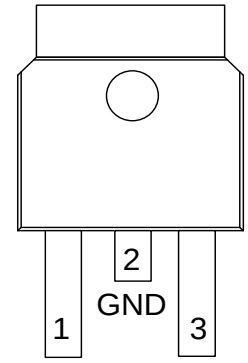
- Battery-powered equipment
- Hand-Hold Equipment
- GRS Receivers
- Wireless LAN

Device Information

ET 78M 05 XX

05 Output Voltage		XX Package	
05	5.0V Fixed Output Voltage	TC	TO-252

Pin Configuration



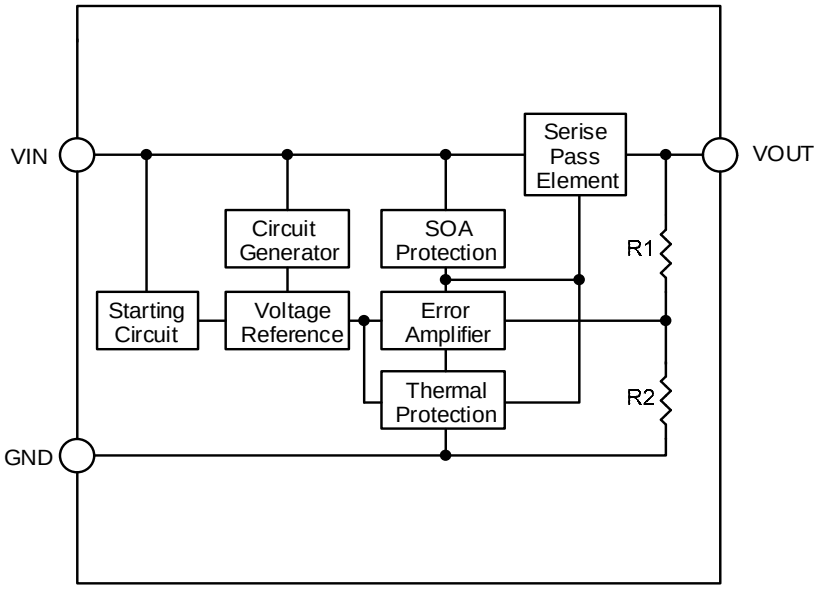
ET78M05TC(TO-252)

Top View

Pin Function

Pin No. TO-252	Symbol	Pin Description
1	VIN	Input voltage pin
2	GND	GND pin
3	VOUT	Output voltage pin

Block Diagram



Operation Description

General

ET78M05TC is designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, and output transistor Safe-Area Compensation that reduces the output short circuit current as the voltage across the pass transistor is increased.

Bypass Capacitor

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A 0.33μF or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

Dropout Voltage

A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0V above the output voltage even during the low point on the input ripple voltage.

Absolute Maximum Ratings(1)

Symbol	Parameters (Items)		Value	Unit
V_{IN}(2)	Input Voltage		-0.3 to 40	V
I_{OUT}	Maximum Load Current		1000	mA
T_J	Junction Temperature		-40 to 150	°C
T_{STG}	Storage Temperature		-65 to 150	°C
T_L	Lead Temperature (Soldering, 10 sec)		260	°C
V_{ESD}	HBM (EIA/JESD22-A114-A)		±5.0	KV
P_{DMAX}	Maximum Power Dissipation	TO-252	2000	mW

Notes:

1: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

2: The maximum input voltage should take into account the maximum power consumption ($P_{D(MAX)}$).

The calculation formula is as follows:

$$P_{D(MAX)} = (V_{IN(MAX)} - V_{OUT}) \times I_{OUT}$$

The maximum power consumption of the IC is 2000mW.

$$V_{IN(MAX)} = 2000mW / I_{OUT} + V_{OUT}$$

For example:

If V_{OUT}= 5.0V, I_{OUT}=200mA, the maximum input voltage is $V_{IN(MAX)}$=2000mW / 200mA + 5.0=15V

Electrical Characteristics

(C_{IN}=0.33μF, C_{OUT}=0.1μF, T_A=25°C, unless otherwise noted)

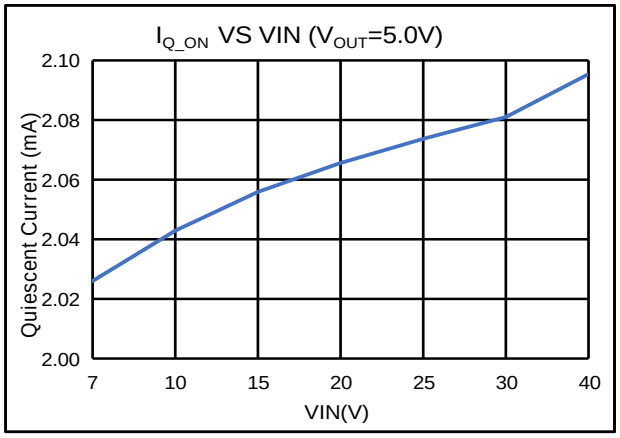
Symbol	Parameters	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	Io=200mA, V_{IN}=10V	4.82	5.0	5.18	V
		I_O=100mA, V_{IN}=7V~15V	4.8	5.0	5.1	
		I_O=1mA~300mA, V_{IN}=8V	4.75	5.0	5.25	
Reg_{LINE}	Line Regulation	V_{IN}=7V~18V, I_O=20mA	-	50	-	mV
Reg_{LOAD}	Load Regulation	V_{IN}=10V, I_O=1mA~500mA	-	100	-	mV
		V_{IN}=10V, I_O=1mA~40mA	-	20	-	
V_{DROP} (3)	Dropout Voltage	T_A=25°C, I_O=100mA	-	1.5	-	V
PSRR(4)	Ripple Rejection	T_A=25°C, f=120Hz, I_O=10mA, V_{IN}=8V	-	55	-	dB
I_Q	Quiescent Current to Ground	V_{IN}=10V, I_{OUT}=40mA	-	2	-	mA
I_{Q_Change}	Quiescent Current to Ground Change	V_{IN}=8V~20V, I_O=1mA	-	0.1	-	mA
		V_{IN}=10V, I_{OUT}=1mA~100mA	-	0.1	-	

Notes3: V_{DROP} FT test method: test the V_{OUT} voltage at V_{SET} +$V_{DROPMAX}$ with output current.

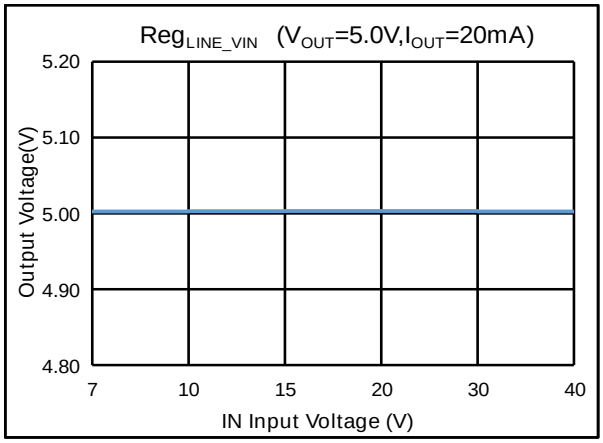
Notes4: Guaranteed by design and characterization. not a FT item.

Typical Characteristics

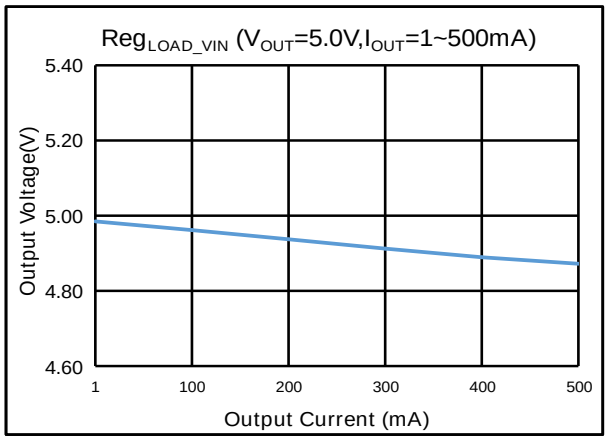
(V_{OUT}=5.0V, C_{IN}=0.33μF, C_{OUT}=0.1μF, unless otherwise noted, T_A = +25°C)



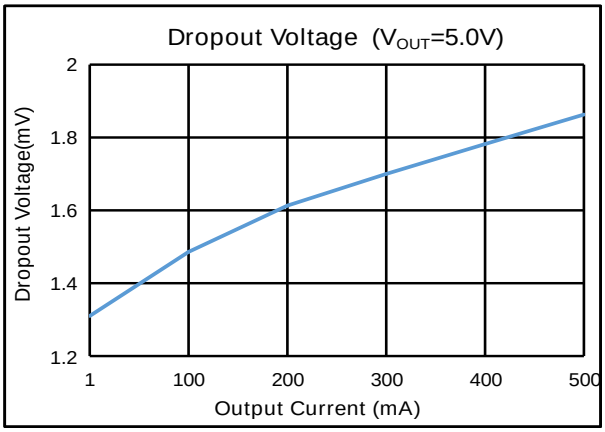
Quiescent Current VS Input Voltage



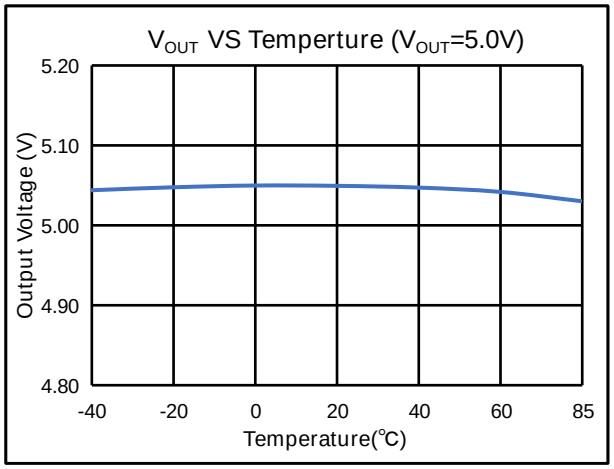
Output Voltage VS Input Voltage



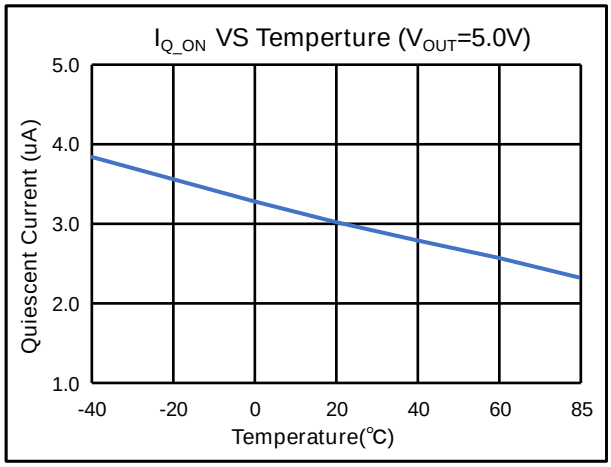
Output Voltage VS Output Current



Dropout Voltage VS Output Current



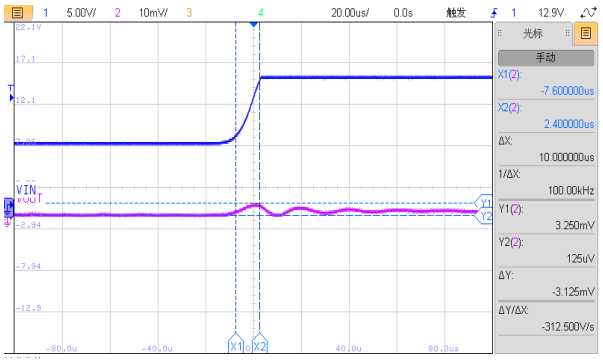
Output Voltage VS Temperature



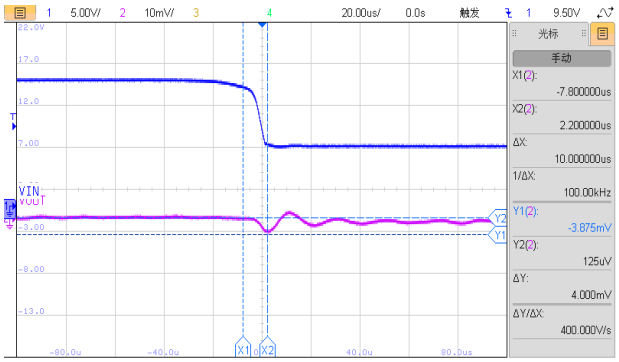
Quiescent Current VS Temperature

Typical Characteristics (Continued)

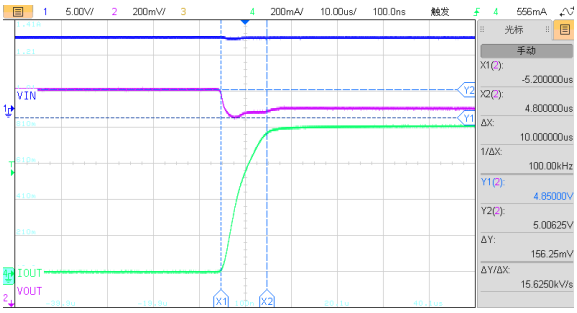
Voltage set 5V (V_{IN} =V_{OUT}+2V, C_{IN} =0.33uF， C_{OUT} = 0.1μF, Typical values are at T_A = +25°C.)



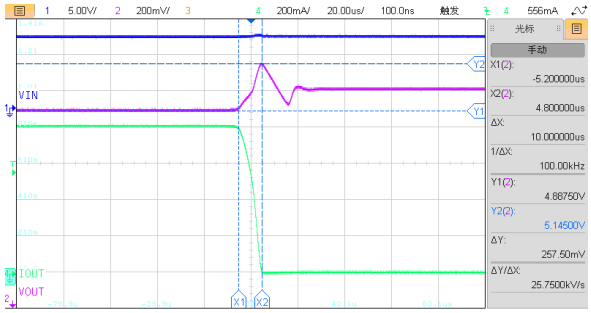
Input-Transient (7~15V, tr=10μs, I_{OUT}=1mA)



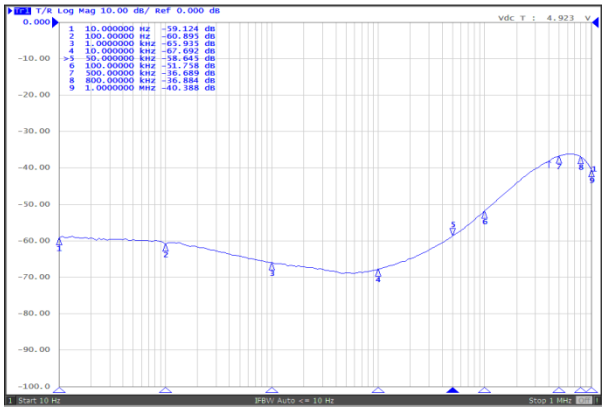
Input-Transient (15~7V, tf=10μs, I_{OUT}=1mA)



Load-Transient (V_{IN} =10V, I_{OUT}=1~800mA, tr=10μs)

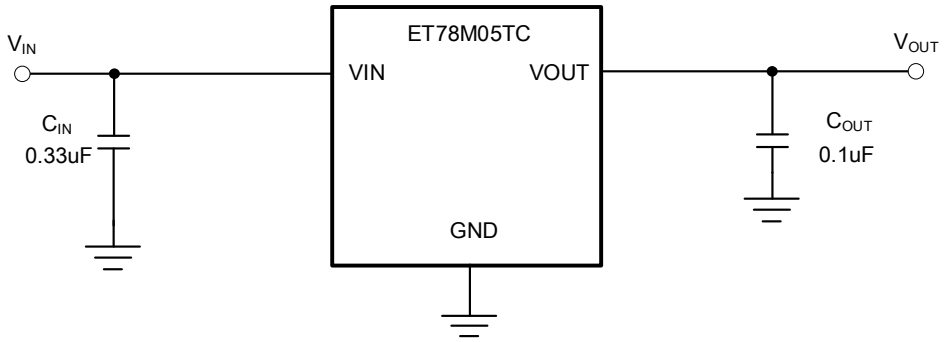


Load-Transient (V_{IN} =10V, I_{OUT}=800~1mA, tf=10μs)

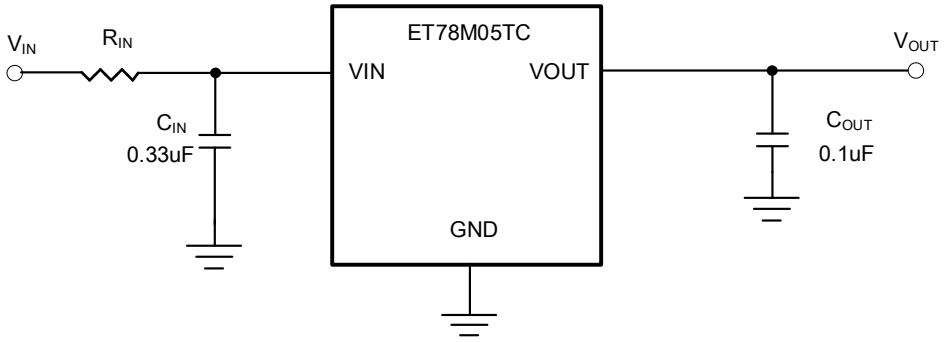


PSRR (I_{OUT}=40mA)

Application Circuits



Fixed Output Circuit



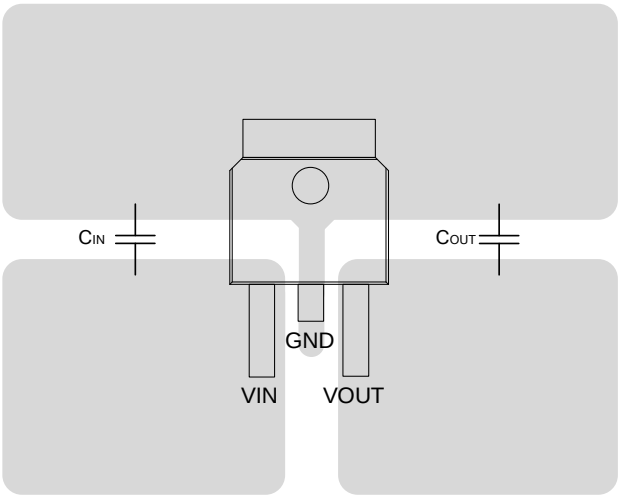
High Input Voltage Fixed Output Circuit with Series Resistor

Note:

C_{IN} is required if regulator is located an appreciable distance from power supply filter.

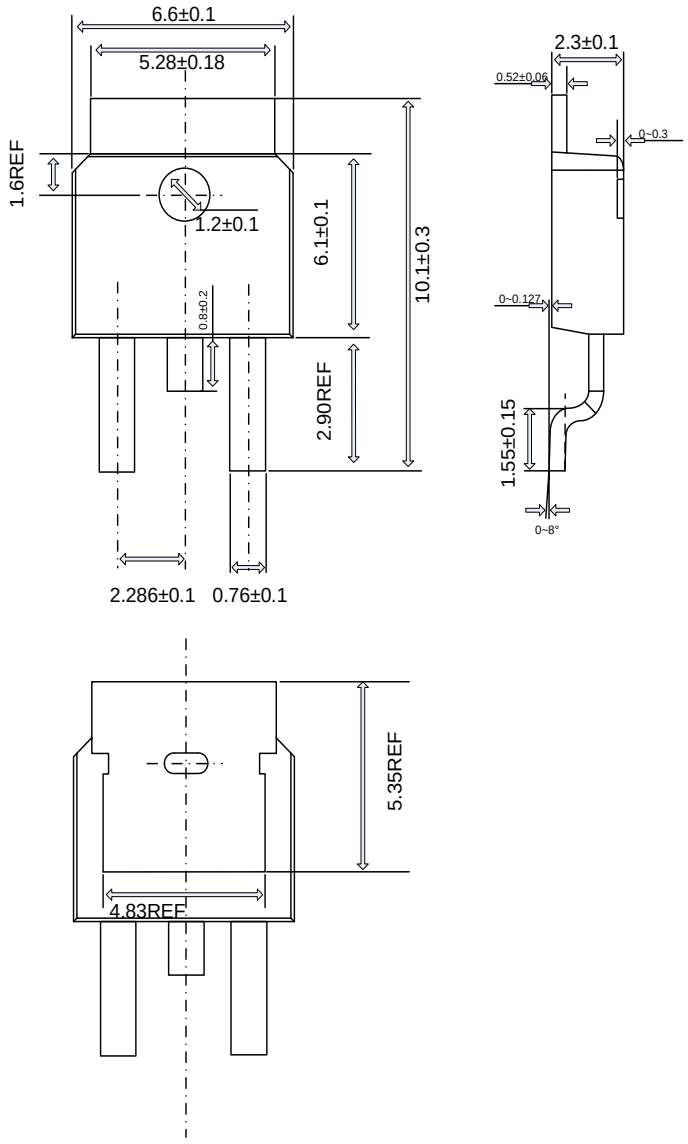
C_{OUT} is not needed for stability; however, it does improve transient response.

PCB Layout Guide



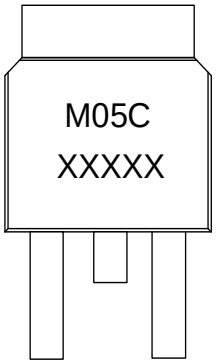
Package Dimension

TO-252



Unit：mm

Marking Information



M05C - Part Number
XXXXX - Tracking Number

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2020-10-12	Initial version	Liu Jia Ying	Wang Guo Peng	Liu Jia Ying
1.1	2023-01-18	Original Version	Yang Xiao Xu	Liu Xiao Min	Yang Xiao Xu
1.2	2024-07-14	Update Electrical Characteristics & Typical Characteristics	Peng Jun Jie	Liu Xiao Min	Liu Jia Ying
1.3	2025-08-15	Update Typical Characteristics	Caoyz	Liuxm	Liujy
1.4	2025-12-8	Update Typeset	Shib	Liuxm	Liujy