

Features

- Output Current: 300mA or more
- Dropout Voltage: 270mV @ 300mA for 3.3V
- Operating Voltage Range: 1.8 to 5.5V
- Output Voltage Range: 1.2 to 3.3V (100mV Step)
- Low Power Consumption: 65 μ A
- High Ripple Rejection: 75dB @ 1kHz
- Output Current-Limit Protection
- Thermal Shutdown Protection
- Operating Temperature Range: -40°C to +85°C
- Low ESR Capacitor Compatible: Ceramic Capacitor
- Lead Free Package: SOT23-3L

Applications

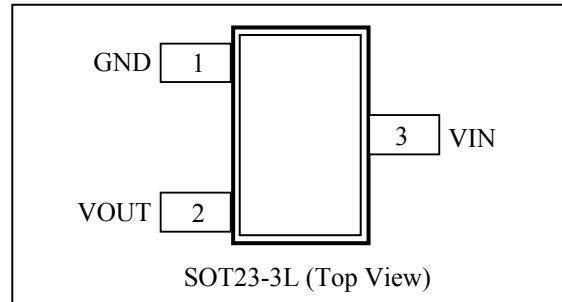
- Mobile phones (GSM, CDMA, WCDMA, CDMA2000 etc.)
- Cordless phones and radio communication
- Digital still cameras and video cameras
- PDAs
- MP3/MP4 players
- Portable devices

Description

The PT7M8205 series are highly accurate, low dropout voltage regulators with low noise, high ripple rejection and low current consumption.

The PT7M8205 includes a reference voltage source, an error amplifier, a driver transistor, a current limit protection, a thermal protection and an internal phase compensator.

The output voltage for the regulator is set by factory trimming within a range of 1.2V to 3.3V in 100mV step includes 2.85V. The PT7M8205 series are stable with low ESR ceramic capacitors.

Pin Configuration

Pin Description

| Pin No. | I/O | Name | Descriptions |
|---------|-----|------|---|
| 1 | P | GND | Ground. |
| 2 | O | VOUT | Output of Regulator. Bypass with a 1 μ F ceramic capacitor (X5R/X7R) to GND. |
| 3 | I | VIN | Regulator Supply Input. Supply voltage can range from 1.8V to 5.5V. Bypass with a 1 μ F ceramic capacitor (X5R/X7R) to GND. |

Maximum Ratings

| | |
|---|-------------------------------|
| Storage Temperature..... | -55 to +125 |
| Ambient Temperature with Power Applied..... | -40 to +85 |
| Input Voltage..... | +6.0V |
| Output Voltage | -0.3 to V _{CC} +0.3V |
| DC Input/Output Current | 700mA |
| Power Dissipation..... | SOT23/400mW |

Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Operating Conditions

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|-----------------|-----------------------|------|------|------|------|
| V _{CC} | Operating Voltage | 1.8 | - | 5.5 | V |
| T _A | Operating temperature | -40 | 25 | 85 | °C |

Electrical Characteristics (T_A=25 °C)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit | |
|---|---|--|-----------------------------------|---------------------|---------------------------|------|---|
| Output Voltage | V _{OUT(E)} *2 | V _{IN} =V _{OUT(S)} *1+1.0V, I _{OUT} =30mA | V _{OUT(S)} *0.98 | V _{OUT(S)} | V _{OUT(S)} *1.02 | V | |
| Maximum Output Current | I _{OUTMAX} | V _{IN} =V _{OUT(S)} +1.0V | 300 | - | - | mA | |
| Dropout Voltage | V _{DIF} *3 | I _{OUT} = 300mA | 1.7V ≤ V _{OUT(S)} ≤ 1.8V | - | 0.39 | 0.51 | V |
| | | | 1.9V ≤ V _{OUT(S)} ≤ 2.3V | - | 0.33 | 0.43 | |
| | | | 2.4V ≤ V _{OUT(S)} ≤ 2.7V | - | 0.30 | 0.39 | |
| | | | 2.8V ≤ V _{OUT(S)} ≤ 3.3V | - | 0.27 | 0.35 | |
| Supply Current | I _{SS} | V _{IN} = V _{OUT(S)} + 1.0V, no load | - | 65 | 100 | μA | |
| Line Regulation | $\frac{\Delta V_{OUT}}{\Delta V_{IN}} * V_{OUT}$ | V _{OUT(S)} +1.0V ≤ V _{IN} ≤ 5.5V I _{OUT} =30 mA | - | 0.05 | 0.2 | %/V | |
| Load Regulation | ΔV_{OUT2} | V _{IN} = V _{OUT(S)} +1.0V, 1.0mA ≤ I _{OUT} ≤ 100mA 300mA | - | - | 0.6 | % | |
| Input Voltage | V _{IN} | - | 1.8 | - | 5.5 | V | |
| Output Voltage Temperature Characteristic | $\frac{\Delta V_{OUT}}{\Delta T_{opr}} * V_{OUT}$ | I _{OUT} =30 mA -40 ≤ T _{opr} ≤ 85 | - | +/-100 | - | ppm/ | |
| Ripple Rejection | PSRR | V _{IN} =[V _{OUT(S)} +1.0]V _{DC} +1Vp-p AC V _{OUT} =1.5V, I _{OUT} =30mA, f=1kHz | - | 75 | - | dB | |
| Current Limit | I _{LIM} | V _{OUT} = V _{OUT(S)} *0.9 | -400 | 450 | -600 | mA | |
| Thermal Shutdown | T _{SD} | - | - | 170 | - | | |
| Thermal Shutdown Hysteresis | ΔT _{SD} | - | - | 40 | - | | |

Note:

*1: V_{OUT(S)}=Specified output voltage.

*2: V_{OUT(E)}=Effective output voltage.

(I.e. the output voltage when "V_{OUT(S)}+1.0V" is provided at the VIN pin while maintaining a certain I_{OUT} value).

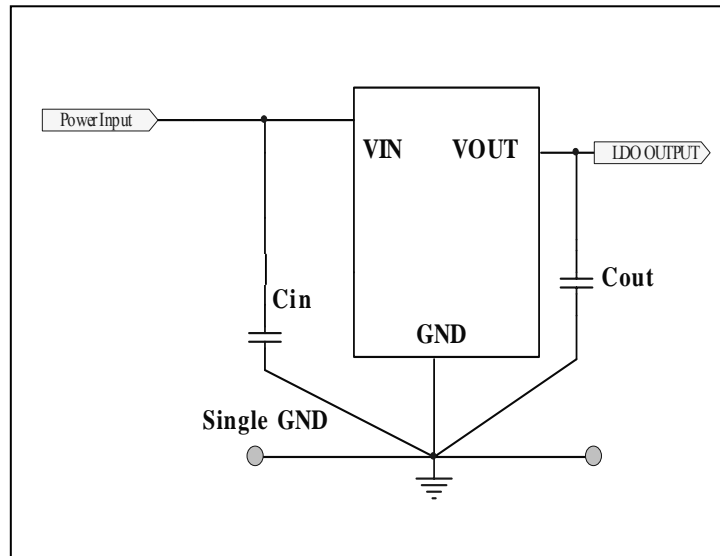
*3: V_{dif}={V_{IN} (*5)-V_{OUT1} (*4)}.

*4: V_{OUT1}=A voltage equal to 98% of the output voltage whenever an amply stabilized I_{OUT} {V_{OUT(S)}+1.0V} is input.

*5: V_{IN1}=The input voltage when V_{OUT1} appears as input voltage is gradually decreased.

*6: Unless otherwise stated noted, V_{IN}=V_{OUT(S)}+1.0V

Application Circuit

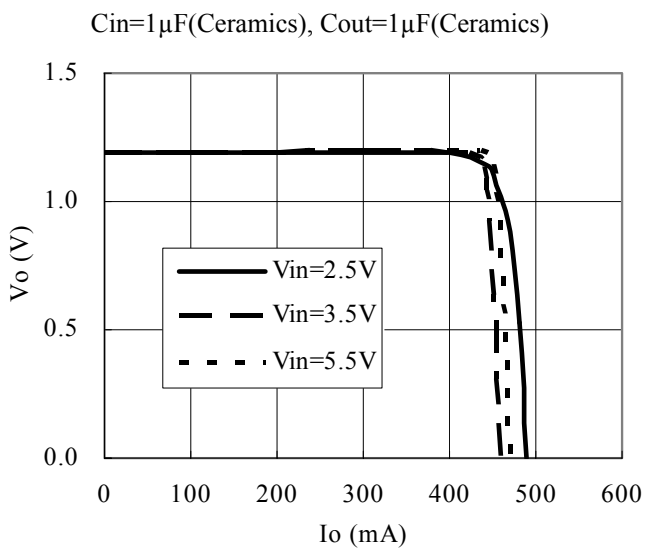


Note: $C_{in}=C_{out}=1\mu F$

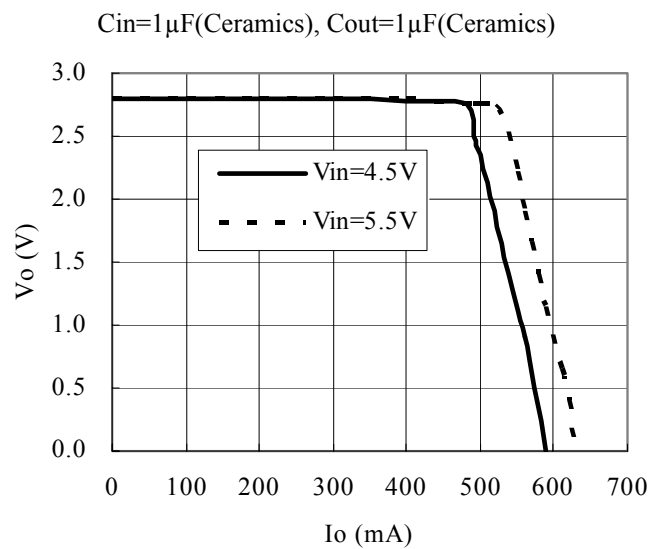
Typical Performance and Characteristics

1. Output Voltage vs. Output Current

PT7M8205 (1.2V)

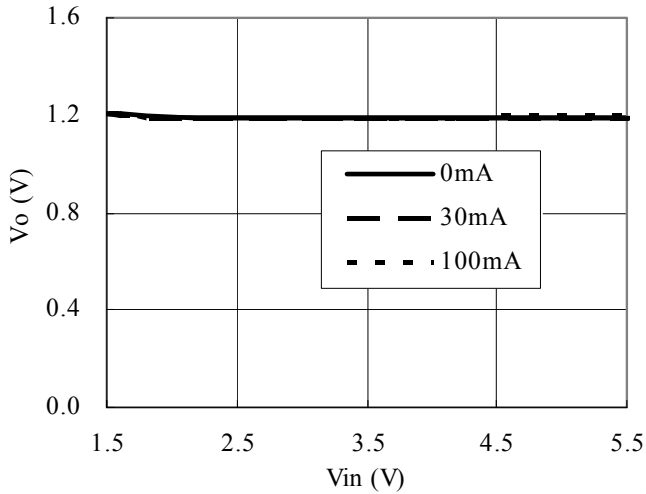


PT7M8205 (3.3V)

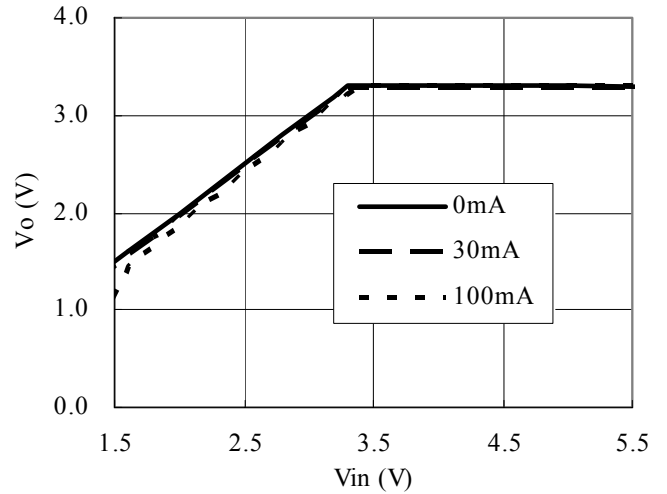
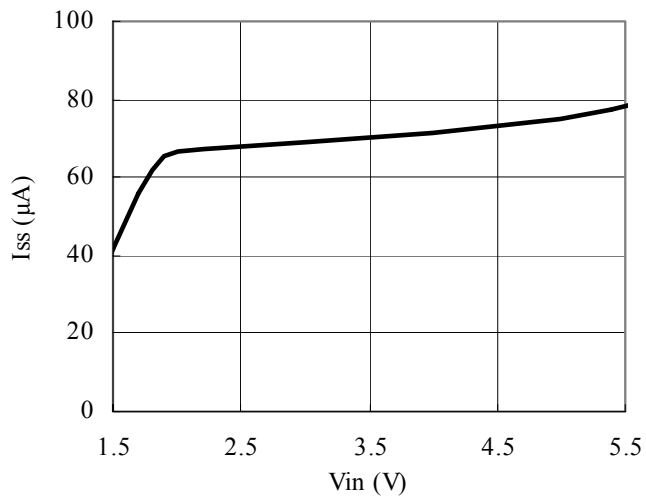
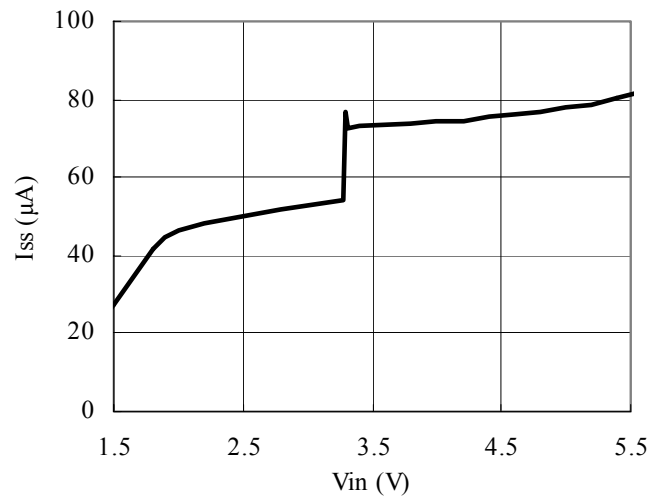


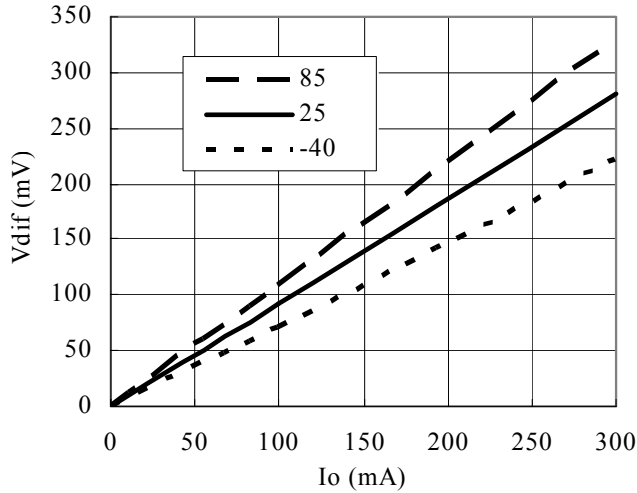
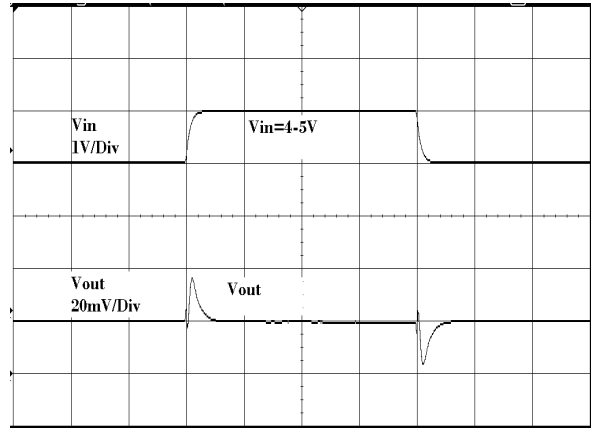
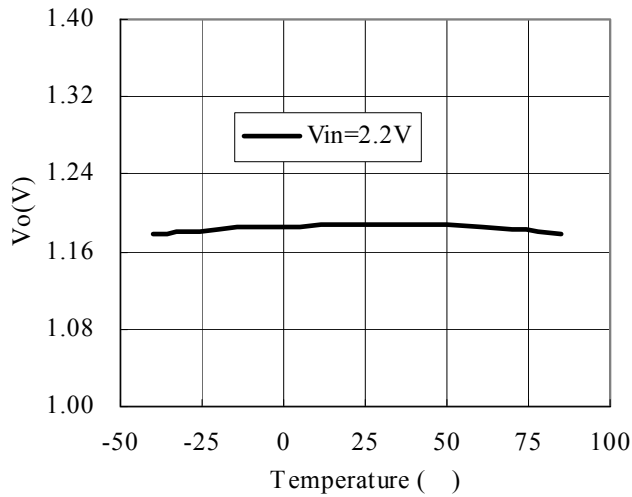
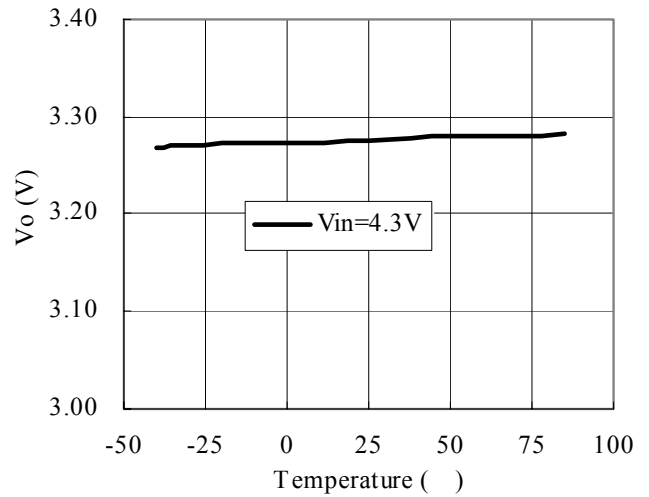
2. Output Voltage vs. Input Voltage
PT7M8205 (1.2V)

Topr=25

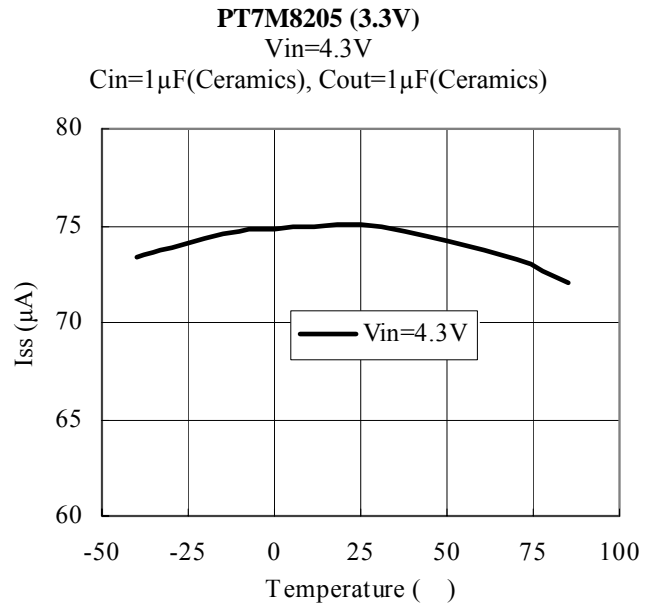
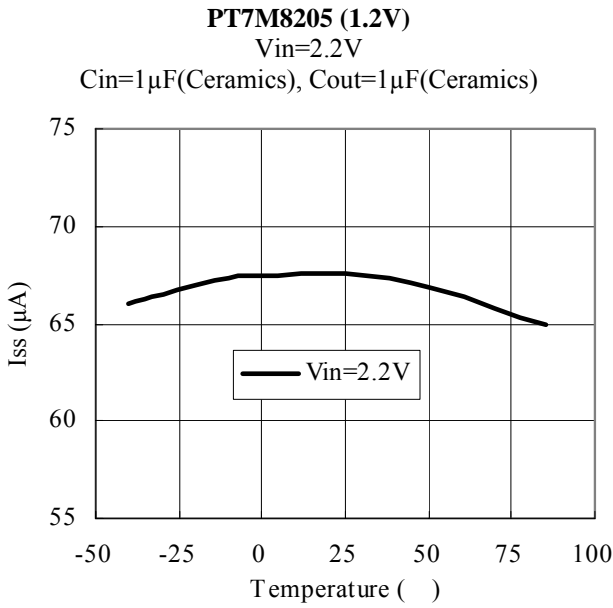
 Cin=1 μ F(Ceramics), Cout=1 μ F(Ceramics)

PT7M8205 (3.3V)

Topr=25

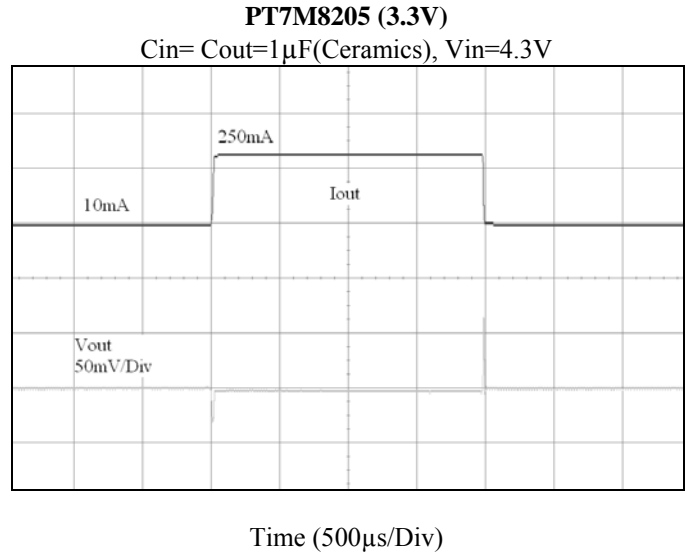
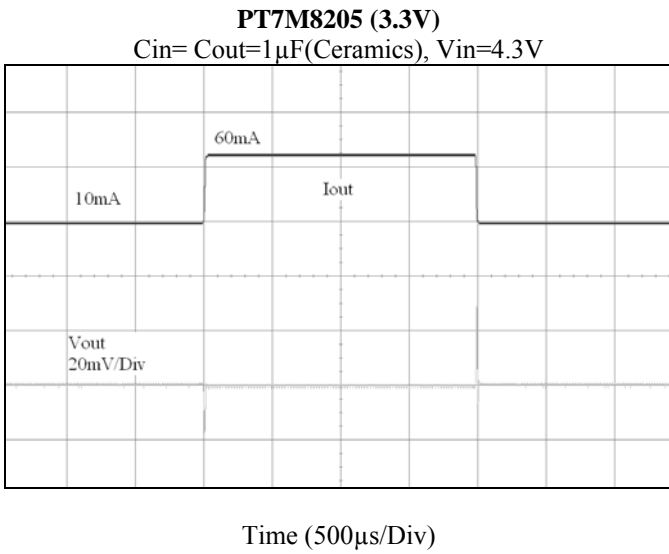
 Cin=1 μ F(Ceramics), Cout=1 μ F(Ceramics)

3. Supply Current vs. Input Voltage
PT7M8205 (1.2V)

PT7M8205 (3.3V)


4. Dropout Voltage vs. Output Current
PT7M8205 (3.3V)
 $C_{in}=1\mu\text{F}(\text{Ceramics}), C_{out}=1\mu\text{F}(\text{Ceramics})$

5. Input Transient Response
PT7M8205 (3.3V)
 $C_{in}=C_{out}=1\mu\text{F}(\text{Ceramics}), I_{out}=100\text{mA}$
 Time (50 $\mu\text{s}/\text{Div}$)

6. Output Voltage vs. Ambient Temperature
PT7M8205 (1.2V)
 $V_{in}=2.2\text{V}$
 $C_{in}=1\mu\text{F}(\text{Ceramics}), C_{out}=1\mu\text{F}(\text{Ceramics})$

PT7M8205 (3.3V)
 $V_{in}=4.3\text{V}$
 $C_{in}=1\mu\text{F}(\text{Ceramics}), C_{out}=1\mu\text{F}(\text{Ceramics})$


7. Supply Current vs. Ambient Temperature



8. Load Transient Response

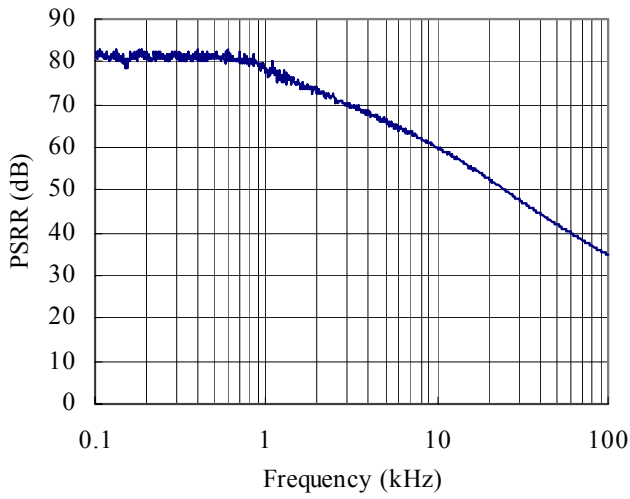


9. PSRR Curve

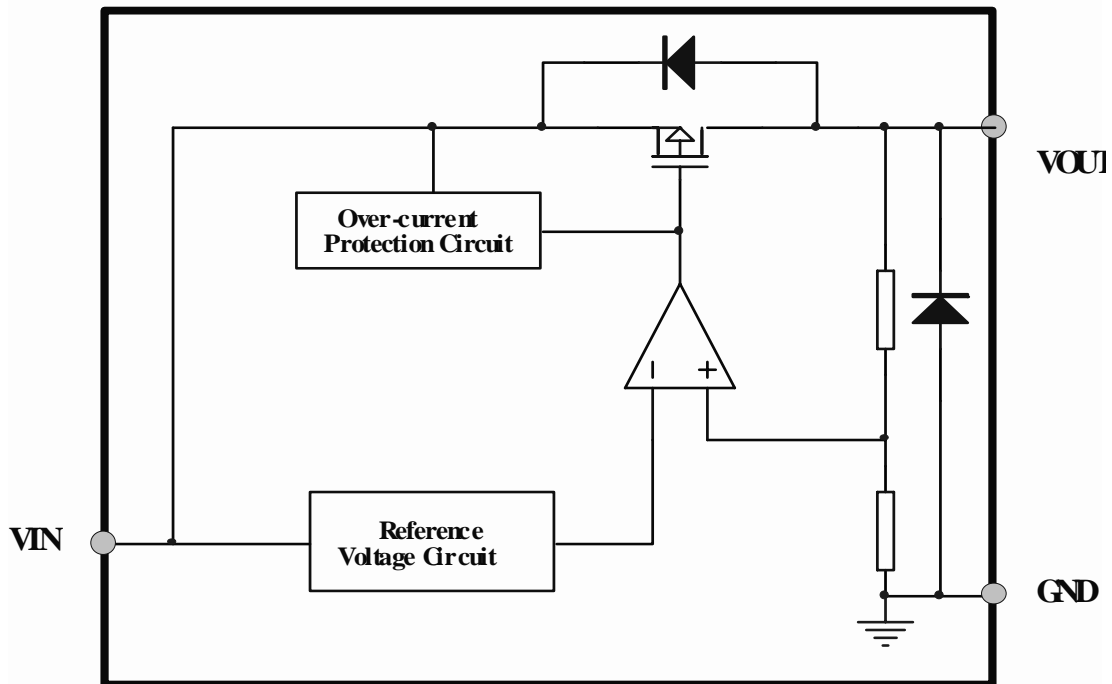
PT7M8205 (1.2V)

V_{in}=2.2V DC+1Vp-pAC

C_{in}=C_{out}=1μF(Ceramics), I_{out}=30mA



Function block diagram



Functional Description *(Refer to Function Block Diagram)*

Output Voltage

The divided output voltage is compared with the internal reference voltage by the error amplifier with internal phase compensator. The output of the error amplifier then drives the P-channel MOSFET to maintain a stable and constant output voltage.

Low ESR Capacitors

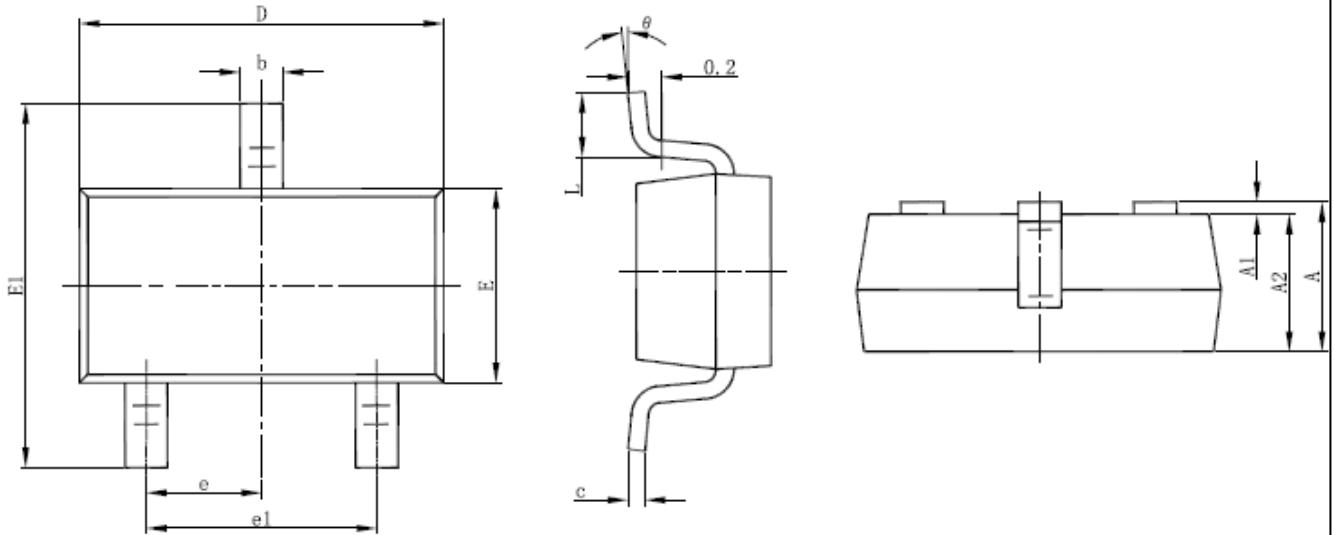
The internal phase compensator maintains the stable output voltage with low ESR ceramic input and output capacitors. 1 μ F low ESR (X5R/X7R) ceramic capacitor located as close as possible to the IC's pins is recommended.

Current Limit and Thermal Shutdown Protections

Current limit protection is used to limit the output current when an overload condition occurs. As a result, the output voltage will drop. Thermal shutdown protection will turn off the output to reduce the power dissipation when the operation junction temperature exceeds 170°C.

NOTE ON USE

1. Please use this IC within the stated absolute maximum ratings.
2. Where wiring impedance is high, operations may become unstable due to noise and/or phase lag depending on output current. Please keep the resistance low between VIN and GND wiring in particular.
3. Please wire the input capacitor (Cin) and the output capacitor (Cout) as close to the IC as possible.

Mechanical Information
TA3E (SOT23-3L)


| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| θ | 0° | 8° | 0° | 8° |

X.XX DENOTES DIMENSIONS
 X.XX IN MILLIMETERS

Note:

1) Controlling dimensions in millimeters.

Ordering Information

| Part Number | Package Code | Package |
|---------------|--------------|------------------------------|
| PT7M8205 TA3E | TA3 | Lead free and Green SOT23-3L |

Notes:

- “ ” refer to different functions. See below Table 1 and Table 2.
- E = Pb-free and Green
- Adding X Suffix= Tape/Reel

Table 1 Option Definition Table

| Designator | Symbol | Description |
|--------------------------|-----------|--|
| Regulator Output Voltage | 12-33, 2A | Internally set sequential number relating output voltage of regulator , the detail is in Table 2 |

Table 2 Definition of designator

| Designator | VOUT (V) | Designator | VOUT (V) | Designator | VOUT (V) |
|------------|----------|------------|----------|------------|----------|
| 12 | 1.2 | 20 | 2.0 | 28 | 2.8 |
| 13 | 1.3 | 21 | 2.1 | 29 | 2.9 |
| 14 | 1.4 | 22 | 2.2 | 30 | 3.0 |
| 15 | 1.5 | 23 | 2.3 | 31 | 3.1 |
| 16 | 1.6 | 24 | 2.4 | 32 | 3.2 |
| 17 | 1.7 | 25 | 2.5 | 33 | 3.3 |
| 18 | 1.8 | 26 | 2.6 | 2A | 2.85 |
| 19 | 1.9 | 27 | 2.7 | | |

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