

Features

- 6A Output Current
- Input Voltage Range: 10.8 V to 13.2 V
- 90% Efficiency
- Adjustable Output Voltage
- Standby Function
- Short Circuit Protection
- Small Footprint (0.61 in²)
- Solderable Copper Case
- 8.8 10⁶ Hours MTBF

Description

The PT6340 Excalibur™ power modules are a series of high performance Integrated Switching Regulators (ISRs), housed in a thermally efficient solderable copper case. These modules operate from a 12V input voltage bus to produce a high-output low-voltage power source; ideal for powering the industry's latest DSP and microprocessors. The series includes standard output bus voltages ranging from 5VDC to 1.2VDC.

The innovative copper case construction provides superior thermal performance in a small footprint. Both through-hole and surface mount pin configurations are available. The PT6340 series operating features include external output voltage adjustment, an On/Off inhibit, and short-circuit protection. A 100µF input, and 330µF output capacitor are required for proper operation.

Ordering Information

- PT6341□ = 5.0 Volts
- PT6342□ = 3.3 Volts
- PT6343□ = 2.5 Volts
- PT6344□ = 1.8 Volts
- PT6345□ = 1.5 Volts
- PT6346□ = 1.2 Volts

PT Series Suffix (PT1234x)

| Case/Pin Configuration | Order Suffix | Package Code * |
|------------------------|--------------|----------------|
| Vertical | N | (EPH) |
| Horizontal | A | (EPJ) |
| SMD | C | (EPK) |

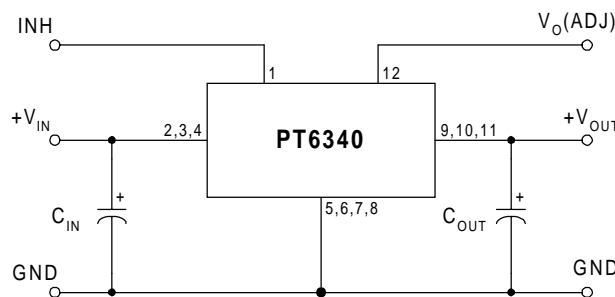
* Previously known as package styles 1540/50.
(Reference the applicable package code drawing for the dimensions and PC board layout)

Pin-Out Information

| Pin | Function |
|-----|------------------------|
| 1 | Inhibit * |
| 2 | V _{in} |
| 3 | V _{in} |
| 4 | V _{in} |
| 5 | GND |
| 6 | GND |
| 7 | GND |
| 8 | GND |
| 9 | V _{out} |
| 10 | V _{out} |
| 11 | V _{out} |
| 12 | V _{out} Adj * |

* For further information, see application notes.

Standard Application



C_{in} = Required 100µF electrolytic
C_{out} = Required 330µF electrolytic

Specifications (Unless otherwise stated, $T_a = 25^\circ\text{C}$, $V_{in} = 12\text{V}$, $C_{in} = 100\mu\text{F}$, $C_{out} = 330\mu\text{F}$, and $I_o = I_{o,max}$)

| Characteristic | Symbol | Conditions | PT6340 SERIES | | | Units |
|--------------------------------|---------------------|--|--|---------------------------------------|----------------------------|---------------------|
| | | | Min | Typ | Max | |
| Output Current | I_o | $T_a = +60^\circ\text{C}$, 200LFM $T_a = +25^\circ\text{C}$, natural convection | 0.1 (1) 0.1 (1) | — — | 6 6 | A |
| Input Voltage Range | V_{in} | Over I_o Range | 10.8 | — | 13.2 | VDC |
| Set Point Voltage Tolerance | V_o tol | | — | ± 1 | ± 2 | $\%V_o$ |
| Temperature Variation | Reg_{temp} | $-40^\circ \leq T_a \leq +85^\circ\text{C}$, $I_o = I_{o,min}$ | — | ± 0.5 | — | $\%V_o$ |
| Line Regulation | Reg_{line} | Over V_{in} range | — | ± 5 | ± 10 | mV |
| Load Regulation | Reg_{load} | Over I_o range | — | ± 5 | ± 15 | mV |
| Total Output Voltage Variation | $\Delta V_{o,tot}$ | Includes set-point, line, load, $-40^\circ \leq T_a \leq +85^\circ\text{C}$ | — | ± 2 | ± 3 | $\%V_o$ |
| Efficiency | η | $I_o = 4\text{A}$ | $V_o = 5.0\text{V}$ $V_o = 3.3\text{V}$ $V_o = 2.5\text{V}$ $V_o = 1.8\text{V}$ $V_o = 1.5\text{V}$ $V_o = 1.2\text{V}$ | — 93 92 91 89 87 85 | — — — — — — | % |
| V_o Ripple (pk-pk) | V_r | 20MHz bandwidth | — | 20 | — | mV _{pp} |
| Transient Response | t_{tr} | 1A/ μs load step, 50% to 100% $I_{o,max}$ | — | 50 | — | μs |
| | ΔV_{tr} | V_o over/undershoot | — | ± 60 | — | mV |
| Short Circuit Threshold | I_{sc} threshold | | — | 8.5 | — | A |
| Switching Frequency | f_s | Over V_{in} and I_o range | 300 | 350 | 400 | kHz |
| Inhibit (Pin 1) | | Referenced to GND (pin 5) | | | | |
| High-Level Input Voltage | V_{IH} | | $V_{in} - 0.5$ | — | Open (2) | V |
| Low-Level Input Voltage | V_{IL} | | -0.2 | — | +0.5 | |
| Low-Level Input Current | I_{IL} | | — | -0.5 | — | mA |
| Standby Input Current | $I_{in, standby}$ | pins 1 & 5 connected | — | +0.5 | — | mA |
| External Output Capacitance | C_{out} | See application schematic | 330 | — | 1,000 | μF |
| External Input Capacitance | C_{in} | See application schematic | 100 | — | — | μF |
| Operating Temperature Range | T_a | Over V_{in} range | -40 (3) | — | +85 (4) | $^\circ\text{C}$ |
| Storage Temperature | T_s | — | -40 | — | +125 | $^\circ\text{C}$ |
| Reliability | MTBF | Per Bellcore TR-332 50% stress, $T_a = 40^\circ\text{C}$, ground benign | 8.8 | — | — | 10 ⁶ Hrs |
| Mechanical Shock | — | Per Mil-Std-883D, method 2002.3, 1ms, half-sine, mounted to a fixture | — | 500 | — | G's |
| Mechanical Vibration | — | Mil-Std-883D, Method 2007.2, 20-2000Hz, soldered in PCB | — | 20 (5) | — | G's |
| Weight | — | | — | 23 | — | grams |
| Flammability | — | Materials meet UL 94V-0 | | | | |

Notes: (1) The ISR will operate at no load with reduced specifications.

(2) The Inhibit control (pin 1) has an internal pull-up and if it is left open circuit the module will operate when input power is applied. The open-circuit voltage is the input voltage V_{in} . Use a discrete MOSFET to control the Inhibit pin, and ensure a transition time of less than $\leq 10\mu\text{s}$. Consult the related application note for other interface considerations.

(3) For operation below 0°C , C_{in} and C_{out} must have stable characteristics. Use either low ESR tantalum or Oscon® capacitors.

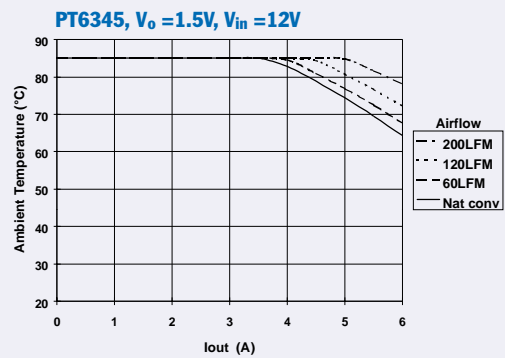
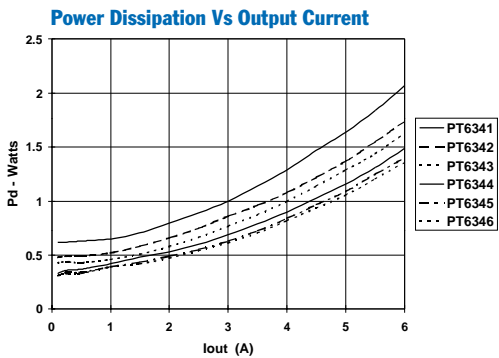
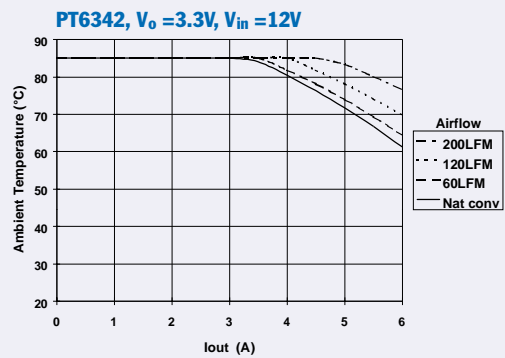
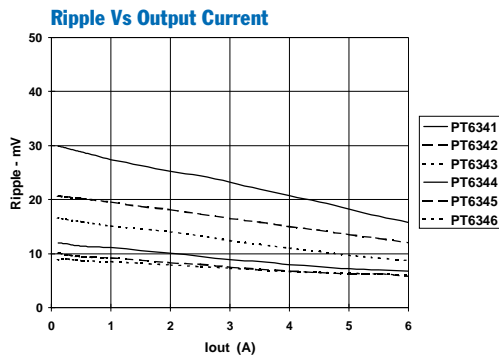
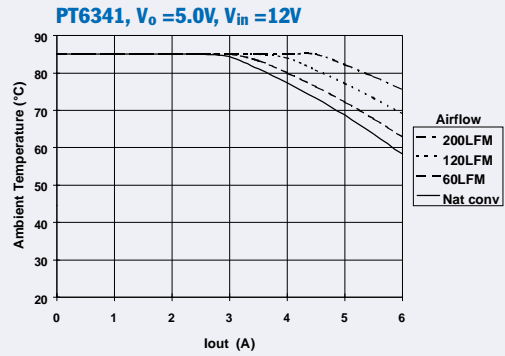
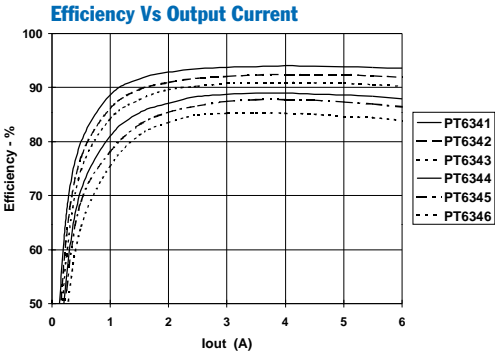
(4) See Safe Operating Area curves or contact the factory for the appropriate derating.

(5) The case pins on through-hole package types (suffixes N & A) must be soldered. For more information consult the applicable package outline drawing.

Input/Output Capacitors: The PT6340 regulator series requires a 100 μF electrolytic (or tantalum) capacitor at the input and 330 μF at the output for proper operation in all applications. In addition, the input capacitance, C_{in} , must be rated for a minimum of 140mA rms of ripple current, and the ESR of the output capacitor, C_{out} , must be less than 50m Ω @ 100kHz. For transient or dynamic load applications additional output capacitance may be necessary. For more information consult the related application note on capacitor recommendations.

PT6340 Series Performance; @ $V_{IN} = 12.0V$ (See Note A)

Safe Operating Area (See Note B)



Note A: Characteristic data has been developed from actual products tested at 25°C. This data is considered typical data for the Converter.
Note B: SOA curves represent the conditions at which internal components are at or below the manufacturer's maximum operating temperatures

Using the Inhibit Function on the PT6340 12V Bus Excalibur™ Series Converters

The PT6340 series are high efficiency regulators that are designed to operate off a 12V input bus. These devices incorporate an inhibit function, which may be used in applications that require a power-up/shutdown feature.

The inhibit function is provided by the *Inhibit** control, pin 1. If pin 1 is left open-circuit the regulator operates normally, and provides a regulated output whenever a valid supply voltage is applied to V_{in} (pins 2–4) with respect to GND (pins 5–8). If a low voltage² is then applied to pin 1 the regulator output will be disabled and the input current drawn by the ISR will typically drop to 0.5mA⁴. The standby control may also be used to hold-off the regulator output during the period that input power is applied.

The *Inhibit** input can be controlled with an open-collector (or open-drain) discrete transistor (See Figure 1). The input is internally pulled-up to the input voltage, V_{in} ¹. Table 1 gives the control voltage requirements.

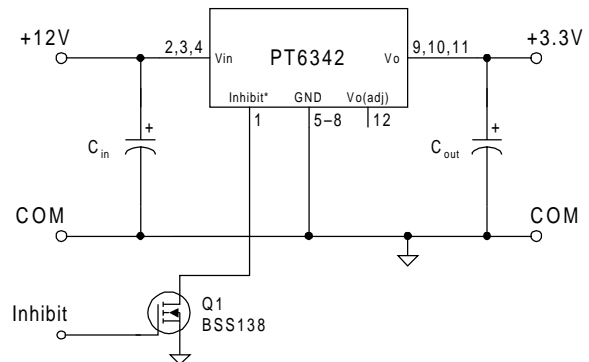
Table 1 Inhibit Control Requirements³

| Parameter | Min | Typ | Max |
|-----------|-------|-------|----------|
| V_{IL} | -0.1V | | 0.6V |
| V_{IH} | 2.0V | | V_{in} |
| I_{IL} | | 0.5mA | |

Notes:

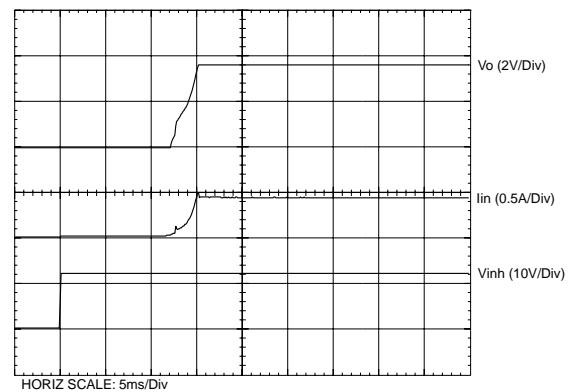
1. The inhibit control input requires no external pull-up resistor. The open-circuit voltage of the *Inhibit** input is typically the input voltage, V_{in} .
2. The inhibit control input is Not compatible with TTL devices. An open-collector device, preferably a discrete bipolar transistor (or MOSFET) is recommended. To ensure the regulator output is disabled, the control pin must be pulled to less than 0.6Vdc with a low-level 0.5mA sink to ground.
3. An external source voltage can be used to control the *Inhibit** pin. To guarantee the inhibit and enable status of the regulator, the source must be capable of meeting the voltage requirements in Table 1.
4. When the regulator output is disabled the current drawn from the input source is typically reduced to 0.5mA.

Figure 1



Turn-On Time: In the circuit of Figure 1, turning Q_1 on applies a low voltage to the *Inhibit** control (pin 1) and disables the regulator output. Correspondingly, turning Q_1 off removes the low-voltage signal and enables the output. Once enabled, the output will typically experience a 10–15ms delay followed by a predictable ramp-up of voltage. The regulator should provide a fully regulated output voltage within 30ms. The waveform of Figure 2 shows the output voltage response of a PT6342 (3.3V) following the turn-off of Q_1 . The turn off of Q_1 corresponds to the rise in V_{inh} . The waveforms were measured with a 12Vdc input voltage, and 2 ½ Adc load.

Figure 2



Capacitor Recommendations for the PT6340 6A Excalibur™ Regulator Series

Input Capacitors:

Output Current $\leq 4A$ Continuous (Table 1)

The recommended input capacitance is determined by 740 milli-amperes (rms) minimum ripple current rating, less than 100m Ω ESR (equivalent series resistance), and 100 μ F minimum capacitance. The ripple current rating, ESR, and operating temperature are the major considerations when selecting the input capacitor.

It is recommended that tantalum capacitors have a minimum voltage rating of twice (2 \times) the maximum dc voltage, plus the ac ripple. This is necessary to insure reliability with 12V input voltage bus applications. None of the 100 μ F tantalum capacitors were found to meet this requirement.

Input Capacitors:

Output Current $>4A$ Continuous (Table 2)

The recommended input capacitance is determined by 1.0 amperes (rms) minimum ripple current rating and 100 μ F minimum capacitance. The ripple current rating, combined with less than 100m Ω ESR (equivalent series resistance) value are the major considerations, along with temperature, when selecting the input capacitor.

It is recommended that tantalum capacitors have a minimum voltage rating of twice (2 \times) the maximum dc voltage, plus the ac ripple. This is necessary to insure reliability for 12V input voltage bus applications. None of the 100 μ F tantalum capacitors were found to meet this requirement.

Output Capacitors:

Output Current 0–6A (Table 1 & Table 2)

The ESR of the required capacitor must be less than, or equal to 50m Ω . Electrolytic capacitors have poor ripple performance at frequencies greater than 400kHz but excellent low frequency transient response. Above the ripple frequency, ceramic decoupling capacitors are necessary to improve the transient response and reduce any high frequency noise components apparent during higher current excursions. Preferred low ESR type capacitor's part numbers are identified in the capacitor tables.

Tantalum Capacitors

Tantalums are acceptable on the output bus but only the AVX TPS series, Sprague 593D/594/595 series or Kemet T495/T510 series. These capacitors are recommended over many other types due to their higher rated surge, power dissipation, and ripple current capability. As a caution, the TAJ series by AVX is not recommended. This series exhibits considerably higher ESR and lower ripple current capability. The TAJ series is also less reliable than the TPS series when determining power dissipation capability. Tantalum or Oscon capacitor types are recommended for applications where ambient temperatures fall below 0°C.

Capacitor Tables

Table 1 and Table 2 identify the vendors with acceptable ESR and maximum allowable ripple current (rms) ratings. The output capacitors are identified in both tables under the "Output Bus" column with the required quantity.

The input capacitors are listed in both tables. Table 1 has the recommended input capacitors when operating the ISR at a load current of 4Adc or less, and Table 2 identifies input capacitors for ISR load currents greater than 4Adc.

This is not an extensive capacitor list. Capacitors from other vendors are available with comparable specifications. Those listed are for guidance. The RMS ripple current rating and ESR (Equivalent Series Resistance at 100kHz) are critical parameters necessary to insure both optimum regulator performance and long capacitor life.

Table 1: Input/Output Capacitors (Output Current ≤4 Amperes Continuous)

| Capacitor Vendor/ Component Series | Capacitor Characteristics | | | | | Quantity | | Vendor Number |
|--|---------------------------|-----------|------------------------------------|---------------------------------|--------------------|-----------|------------|--------------------|
| | Working Voltage | Value(µF) | (ESR) Equivalent Series Resistance | Max Ripple Current @85°C (Irms) | Physical Size (mm) | Input Bus | Output Bus | |
| Panasonic FC (Radial) | 35V | 220µF | 0.09Ω +2 | 755mA | 10 ×12.5 | 1 | 2 | EEUF1V221 |
| | 35V | 180µF | 0.09Ω +2 | 755mA | 10 ×12.5 | 1 | 2 | EEUF1V181 |
| | 50V | 680µF | 0.048Ω | 1835mA | 16 ×20 | 1 | 1 | EEUF1H681 |
| FC (Surface Mount) | 63V | 220µF | 0.09Ω +2 | 1410mA | 16 ×16.5 | 1 | 2 | EEVFC1J221N |
| | 35V | 330µF | 0.12Ω +3 | 1205mA | 12.5 ×16 | 1 | 3 | EEVFC1V331LQ |
| | 35V | 470µF | 0.043Ω | 1690mA | 16 ×16.5 | 1 | 1 | EEVFC1V471N |
| United Chemi-Con, LXV/LXZ | 50V | 120µF | 0.12Ω +3 | 755mA | 10 ×16 | 1 | 3 | LXV50VB121M10X16LL |
| | 35V | 220µF | 0.09Ω +2 | 760mA | 10 ×12.5 | 1 | 2 | LXZ35VB221M10X12LL |
| FS | 10V | 330µF | 0.025Ω | 3500mA | 10 ×10.5 | N/R | 1 | 10FS330M |
| | 20V | 150µF | 0.03Ω +2 | 3200mA | 10 ×10.5 | 1 | 2 | 20FS150M |
| Nichicon, PL | 35V | 560µF | 0.048Ω | 1360mA | 16 ×15 | 1 | 1 | UPL1V561MHH6 |
| | 35V | 330µF | 0.065Ω +2 | 1020mA | 12.5 ×15 | 1 | 2 | UPL1V331MHH6 |
| PM | 50V | 470µF | 0.046Ω | 1470mA | 18 ×15 | 1 | 1 | UPM1H4711MHH6 |
| Osccon, SS (Radial) | 10V | 330µF | 0.025Ω | >3500mA | 10.0 ×10.5 | N/R | 1 | 10SS330M |
| SV (Surface Mount) | 10V | 330µF | 0.025Ω | >3800mA | 10.3 ×10.3 | N/R | 1 | 10SV300M |
| | 20V | 150µF | 0.024Ω +2 | 3600mA | 10.3 ×10.3 | 1 | 2 | 20SV150M |
| AVX Tantalum TPS | 10V | 330µF | 0.1Ω +2 | >2500mA | 7.3L | N/R | 2 | TPSV337M010R0100 |
| | 10V | 330µF | 0.1Ω +2 | >3000mA | ×4.3W | N/R | 2 | TPSV337M010R0060 |
| | 25V | 68µF | 0.095Ω | >2000mA | ×4.1H | 2 | N/R | TPSV686M025R0095 |
| Kemet, T510 T495 | 10V | 330µF | 0.033Ω | 1400mA | 7.3L ×5.7W | N/R | 1 | T510X337M010AS |
| | 10V | 220µF | 0.07Ω +2 | >2000mA | ×4.0H | N/R | 2 | T495X227M010AS |
| Sprague, 594D | 10V | 330µF | 0.045Ω | 2350mA | 7.3L ×6.0W | N/R | 1 | 594D337X0010R2T |
| | 25V | 68µF | 0.095Ω | 1600mA | ×4.1H | 2 | N/R | 594D686X0025R2T |

N/R –Not recommended. The voltage rating does not meet the minimim operating limits.

Table 2: Input/Output Capacitors (Output Current >4 Amperes Continuous)

| Capacitor Vendor/ Component Series | Capacitor Characteristics | | | | | Quantity | | Vendor Number |
|--|---------------------------|-----------|------------------------------------|---------------------------------|--------------------|-----------|------------|---------------------|
| | Working Voltage | Value(µF) | (ESR) Equivalent Series Resistance | Max Ripple Current @85°C (Irms) | Physical Size (mm) | Input Bus | Output Bus | |
| Panasonic, FC (Radial) | 35V | 680µF | 0.043Ω | 1655mA | 12.5 ×20 | 1 | 1 | EEUF1V681 |
| | 35V | 560µF | 0.038Ω | 1655mA | 12.5 ×20 | 1 | 1 | EEUF1V561S |
| | 50V | 680µF | 0.048Ω | 1835mA | 16 ×20 | 1 | 1 | EEUF1H681 |
| FC (Surface Mount) | 63V | 220µF | 0.09+2Ω | 1410mA | 16 ×16.5 | 1 | 2 | EEVFC1J221N |
| | 35V | 330µF | 0.12+3Ω | 1205mA | 12.5 ×16 | 1 | 3 | EEVFC1V331LQ |
| | 35V | 470µF | 0.043Ω | 1690mA | 16 ×16.5 | 1 | 1 | EEVFC1V471N |
| United Chemi-con LXV/LXZ/ FX/FS | 35V | 330µF | 0.068Ω | 1050mA | 10 ×16 | 1 | 2 | LXZ35VB331M110X16LL |
| | 25V | 820µF | 0.046Ω | 1340mA | 12 ×20 | 1 | 1 | LXV25VB820M12X20LL |
| | 10V | 390µF | 0.030Ω | 3080mA | 8 ×10.5 | N/R | 1 | 10FX390M |
| | 20V | 150µF | 0.024Ω | 3200mA | 8 ×10.5 | 1 | 2 | 20FX150M |
| Nichicon, PL | 35V | 560µF | 0.048Ω | 1360mA | 16 ×15 | 1 | 1 | UPL1V561MHH6 |
| | 35V | 330µF | 0.06+2Ω | 1020mA | 12.5 ×15 | 1 | 2 | UPL1V331MHH6 |
| PM | 35V | 560µF | 0.0048Ω | 1360mA | 16 ×15 | 1 | 1 | UPM1V561MHH6 |
| Osccon, SS (Radial) | 10V | 330µF | 0.025Ω | >3500mA | 10.0 ×10.5 | N/R | 1 | 10SS330M |
| SV (Surface Mount) | 10V | 330µF | 0.025Ω | >3800mA | 10.3 ×10.3 | N/R | 1 | 10SV330M |
| | 20V | 150µF | 0.02+2Ω | 3600mA | 10.3 ×10.3 | 1 | 2 | 20SV150M |
| AVX Tantalum, TPS | 10V | 330µF | 0.1+2Ω | >2500mA | 7.3L | N/R | 2 | TPSV337M010R0100 |
| | 10V | 330µF | 0.1+2Ω | >3000mA | ×4.3W | N/R | 2 | TPSV337M010R0060 |
| | 25V | 68µF | 0.095Ω | >2000mA | ×4.1H | 2 | N/R | TPSV686M025R0095 |
| Kemet, T510 T495 | 10V | 330µF | 0.033Ω | 1400mA | 7.3L ×5.7W | N/R | 1 | T510X337M010AS |
| | 10V | 220µF | 0.07Ω+2 | >2000mA | ×4.0H | N/R | 2 | T495X227M010AS |
| Sprague, 594D | 10V | 330µF | 0.045Ω | 2350mA | 7.3L ×6.0W | N/R | 1 | 594D337X0010R2T |
| | 25V | 68µF | 0.095Ω | 1600mA | ×4.1H | 2 | N/R | 594D686X0025R2T |

N/R –Not recommended. The voltage rating does not meet the minimim operating limits.

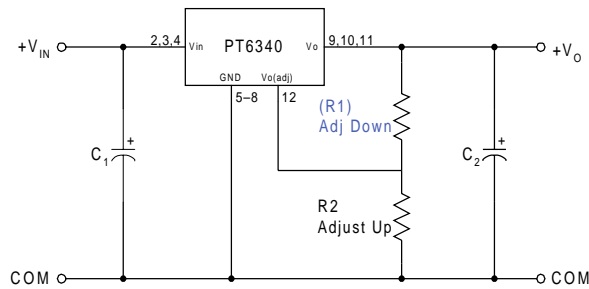
Adjusting the Output Voltage of the PT6340 Excalibur™ 6 A, 12 V Bus Step-Down ISRs

The output voltage of the PT6340 Series ISRs may be adjusted higher or lower than the factory trimmed pre-set voltage with the addition of a single external resistor. Table 1 accordingly gives the allowable adjustment range for each model for either series as V_a (min) and V_a (max).

Adjust Up: An increase in the output voltage is obtained by adding a resistor R_2 , between pin 12 (V_o adj) and pins 5-8 (GND).

Adjust Down: Add a resistor (R_1), between pin 12 (V_o adj) and pins 9-10-11 (V_o).

Figure 1



The values of (R_1) [adjust down], and R_2 [adjust up], can also be calculated using the following formulas. Refer to Figure 1 and Table 2 for both the placement and value of the required resistor; either (R_1) or R_2 as appropriate.

$$(R_1) = \frac{R_o (V_a - V_r)}{V_o - V_a} - R_s \quad \text{k}\Omega$$

$$R_2 = \frac{V_r \cdot R_o}{V_a - V_o} - R_s \quad \text{k}\Omega$$

Where: V_o = Original output voltage
 V_a = Adjusted output voltage
 V_r = Reference voltage (Table 1)
 R_o = Resistance constant (Table 1)
 R_s = Internal series resistance (Table 1)

Notes:

1. Use only a single 1% resistor in either the (R_1) or R_2 location. Place the resistor as close to the ISR as possible.
2. Never connect capacitors from V_o adj to either GND or V_{out} . Any capacitance added to the V_o adj pin will affect the stability of the ISR.

Table 1

| ISR ADJUSTMENT RANGE AND FORMULA PARAMETERS | | | | | | |
|---|--------|--------|--------|--------|--------|--------|
| Series Pt # | PT6341 | PT6342 | PT6343 | PT6244 | PT6345 | PT6346 |
| V_o (nom) | 5.0 | 3.3 | 2.5 | 1.8 | 1.5 | 1.2 |
| V_a (min) | 4.0 | 2.8 | 2.2 | 1.7 | 1.45 | 1.1 |
| V_a (max) | 5.5 | 3.8 | 3.0 | 2.3 | 2.0 | 1.45 |
| V_r (V) | 1.27 | 1.27 | 1.27 | 1.27 | 1.27 | 0.8 |
| R_o (k Ω) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| R_s (k Ω) | 24.9 | 24.9 | 24.9 | 24.9 | 24.9 | 24.9 |

Table 2

ISR ADJUSTMENT RESISTOR VALUES

| Series Pt # | PT6343 | PT6344 | PT6345 | PT6346 | Series Pt # | PT6341 | PT6342 |
|------------------------|-----------|----------|----------|----------|------------------------|-----------|-----------|
| V _o (nom) | 2.5 | 1.8 | 1.5 | 1.2V | V _o (nom) | 5.0 | 3.3V |
| V _a (req'd) | | | | | V _a (req'd) | | |
| 1.1 | | | | (5.1)kΩ | 2.8 | | (5.7)kΩ |
| 1.15 | | | | (45.1)kΩ | 2.85 | | (10.2)kΩ |
| 1.2 | | | | | 2.9 | | (15.8)kΩ |
| 1.25 | | | | 135.0kΩ | 2.95 | | (22.9)kΩ |
| 1.3 | | | | 55.1kΩ | 3.0 | | (32.8)kΩ |
| 1.35 | | | | 28.4kΩ | 3.05 | | (46.3)kΩ |
| 1.4 | | | | 15.1kΩ | 3.1 | | (66.6)kΩ |
| 1.45 | | | (11.1)kΩ | 7.1kΩ | 3.15 | | (100.0)kΩ |
| 1.5 | | | | | 3.2 | | (168.0)kΩ |
| 1.55 | | | 229.0kΩ | | 3.25 | | (371.0)kΩ |
| 1.6 | | | 102.0kΩ | | 3.3 | | |
| 1.65 | | | 59.8kΩ | | 3.35 | | 229.0kΩ |
| 1.7 | | (18.1)kΩ | 38.6kΩ | | 3.4 | | 102.0kΩ |
| 1.75 | | (71.1)kΩ | 25.9kΩ | | 3.45 | | 59.8kΩ |
| 1.8 | | | 17.4kΩ | | 3.5 | | 38.6kΩ |
| 1.85 | | 229.0kΩ | 11.4kΩ | | 3.6 | | 17.4kΩ |
| 1.9 | | 102.0kΩ | 6.9kΩ | | 3.7 | | 6.9kΩ |
| 1.95 | | 59.8kΩ | 3.3kΩ | | 3.8 | | 0.5kΩ |
| 2.0 | | 38.6kΩ | 0.5kΩ | | 4.0 | (2.4)kΩ | |
| 2.05 | | 25.9kΩ | | | 4.1 | (6.5)kΩ | |
| 2.1 | | 17.4kΩ | | | 4.2 | (11.7)kΩ | |
| 2.15 | (0.0)kΩ | 11.4kΩ | | | 4.3 | (18.4)kΩ | |
| 2.2 | (6.1)kΩ | 6.9kΩ | | | 4.4 | (27.3)kΩ | |
| 2.25 | (14.3)kΩ | 3.3kΩ | | | 4.5 | (39.7)kΩ | |
| 2.3 | (26.6)kΩ | 0.5kΩ | | | 4.6 | (58.3)kΩ | |
| 2.35 | (47.1)kΩ | | | | 4.7 | (89.4)kΩ | |
| 2.4 | (88.1)kΩ | | | | 4.8 | (152.0)kΩ | |
| 2.45 | (206.0)kΩ | | | | 4.9 | (338.0)kΩ | |
| 2.5 | | | | | 5.0 | | |
| 2.55 | 229.0kΩ | | | | 5.1 | 102kΩ | |
| 2.6 | 102.0kΩ | | | | 5.2 | 38.6kΩ | |
| 2.65 | 59.8kΩ | | | | 5.3 | 17.4kΩ | |
| 2.7 | 38.6kΩ | | | | 5.4 | 6.9kΩ | |
| 2.75 | 25.9kΩ | | | | 5.5 | 0.5kΩ | |
| 2.8 | 17.4kΩ | | | | | | |
| 2.85 | 11.4kΩ | | | | | | |
| 2.9 | 6.9kΩ | | | | | | |
| 2.95 | 3.4kΩ | | | | | | |
| 3.0 | 0.5kΩ | | | | | | |

R1 = (Blue) R2 = Black

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/ Ball Finish | MSL Peak Temp ⁽³⁾ | Samples (Requires Login) |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|----------------------|------------------------------|-----------------------------|
| PT6341A | NRND | SIP MODULE | EPJ | 12 | 21 | Pb-Free (RoHS) | Call TI | N / A for Pkg Type | |
| PT6341N | NRND | SIP MODULE | EPH | 12 | 21 | Pb-Free (RoHS) | Call TI | N / A for Pkg Type | |
| PT6342A | NRND | SIP MODULE | EPJ | 12 | 21 | Pb-Free (RoHS) | Call TI | N / A for Pkg Type | |
| PT6342C | NRND | SIP MODULE | EPK | 12 | 21 | Pb-Free (RoHS) | Call TI | Level-1-215C-UNLIM | |
| PT6342N | NRND | SIP MODULE | EPH | 12 | 21 | Pb-Free (RoHS) | Call TI | N / A for Pkg Type | |
| PT6343A | NRND | SIP MODULE | EPJ | 12 | 21 | Pb-Free (RoHS) | Call TI | N / A for Pkg Type | |
| PT6343C | NRND | SIP MODULE | EPK | 12 | 21 | Pb-Free (RoHS) | Call TI | Level-1-215C-UNLIM | |
| PT6343N | NRND | SIP MODULE | EPH | 12 | 21 | Pb-Free (RoHS) | Call TI | N / A for Pkg Type | |
| PT6344C | NRND | SIP MODULE | EPK | 12 | 21 | Pb-Free (RoHS) | Call TI | Level-1-215C-UNLIM | |
| PT6344N | NRND | SIP MODULE | EPH | 12 | 21 | Pb-Free (RoHS) | Call TI | N / A for Pkg Type | |
| PT6345C | NRND | SIP MODULE | EPK | 12 | 21 | Pb-Free (RoHS) | Call TI | Level-1-215C-UNLIM | |
| PT6345N | NRND | SIP MODULE | EPH | 12 | 21 | Pb-Free (RoHS) | Call TI | N / A for Pkg Type | |
| PT6346A | OBSOLETE | SIP MODULE | EPJ | 12 | | TBD | Call TI | Call TI | |

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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