

DESCRIPTION

The MPQ9361 is a high performance, regulated charge pump converter. Its input voltage ranges from 2.8V to V_{out} . The output voltage is regulated to a fixed 5V. No external inductor is required for simplicity and compactness. Internal soft-start circuit effectively reduces the in-rush current both while start-up and mode change.

The MPQ9361 is available in a compact TSOT23-6 package

FEATURES

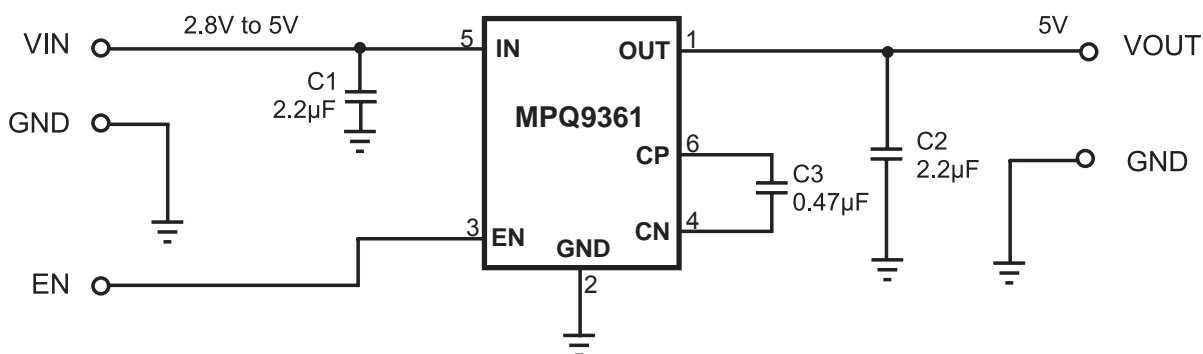
- Guaranteed Industrial Temp Range Limits
- Input Voltage Range: 2.8V to 5V
- Internal Soft-Start
- Output Maximum Current up to 110mA
- Fixed 5V Output Voltage with 30mV Ripple
- 2X Charge Pump
- Fixed 1.35MHz Switching Frequency
- Over Current Protection
- Short Circuit Protection
- In-rush Current limit
- TSOT23-6 package and Lead (pb)-Free

APPLICATIONS

- Cell phone, Smart phone, LED backlight
- PDA or hand Held Computer
- Camera Flash White LED
- LCD Display Supply
- TV-Remote Control

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TYPICAL APPLICATION

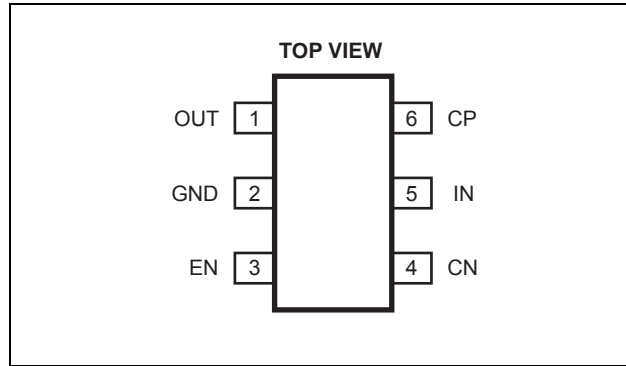


ORDERING INFORMATION

Part Number*	Package	Top Marking	Free Air Temperature (T _A)
MPQ9361DJ	TSOT23-6	U2	-40°C to +85°C

* For Tape & Reel, add suffix -Z (e.g. MP MPQ9361DJ-Z);
 For RoHS compliant packaging, add suffix -LF (e.g. MPQ9361DJ-LF-Z)

PACKAGE REFERENCE



ABSOLUTE MAXIMUM RATINGS ⁽¹⁾

Supply Input Voltage.....	-0.3V to +6.0V
All Other Pins.....	-0.3V to +6.0V
Storage Temperature.....	-65°C to +150°C
Continuous Power Dissipation (T _A = +25°C) ⁽²⁾	0.64W
Junction Temperature.....	+150°C
Lead Temperature.....	+260°C

Recommended Operating Conditions ⁽³⁾

Supply Voltage V _{IN}	2.8V to 5.0V
Output Voltage V _{OUT}	5.0V
Operating Junct. Temp (T _J).....	-40°C to +125°C

Thermal Resistance ⁽⁴⁾	θ_{JA}	θ_{JC}
TSOT23-6.....	195.....	25... °C/W

Notes:

- 1) Exceeding these ratings may damage the device.
- 2) The maximum allowable power dissipation is a function of the maximum junction temperature T_J(MAX), the junction-to-ambient thermal resistance θ_{JA} , and the ambient temperature T_A. The maximum allowable continuous power dissipation at any ambient temperature is calculated by P_D(MAX)=(T_J(MAX)-T_A)/ θ_{JA} . Exceeding the maximum allowable power dissipation will cause excessive die temperature, and the regulator will go into thermal shutdown. Internal thermal shutdown circuitry protects the device from permanent damage.
- 3) The device is not guaranteed to function outside of its operating conditions.
- 4) Measured on JESD51-7 4-layer board.

ELECTRICAL CHARACTERISTICS

$V_{IN}=3.7V$, $C_{IN}=C_{OUT}=2.2\mu F$, $C_P=0.22\mu F$, $T_A=-40^{\circ}C$ to $+85^{\circ}C$. Typical values are at $T_A=25^{\circ}C$, unless otherwise noted.

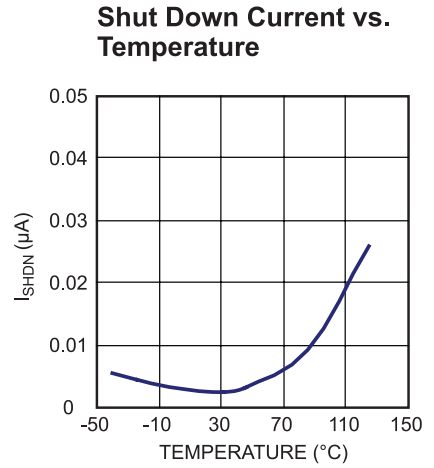
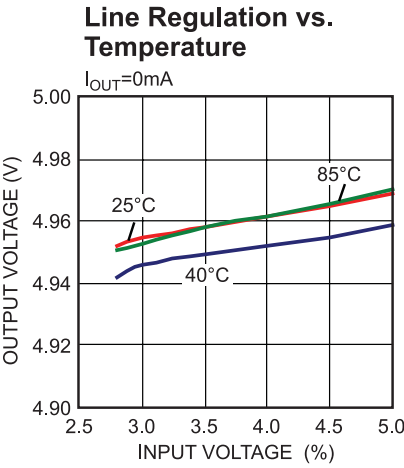
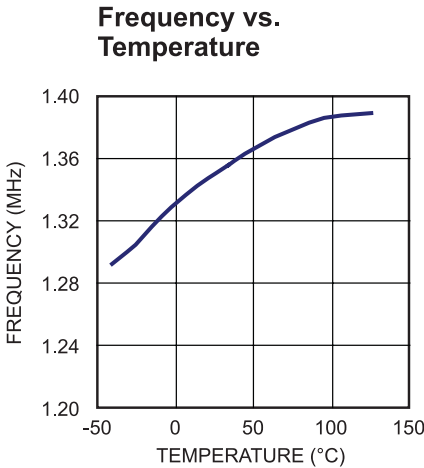
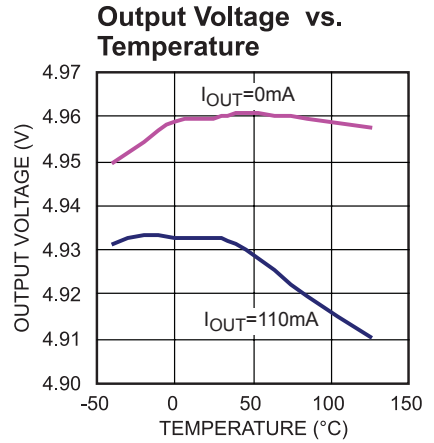
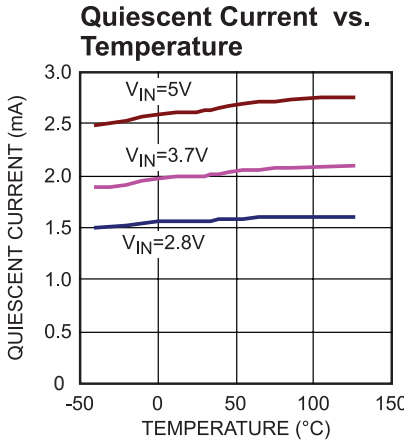
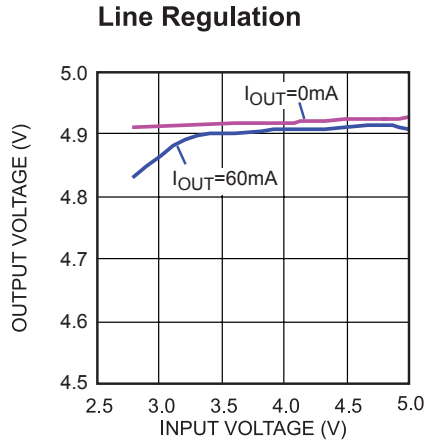
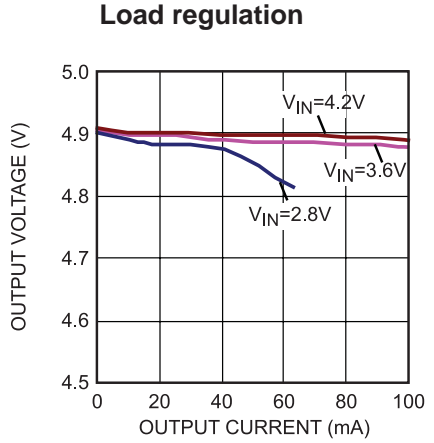
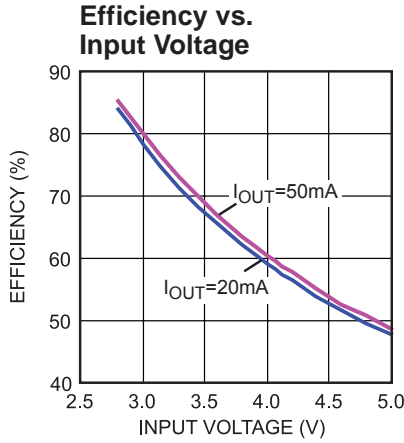
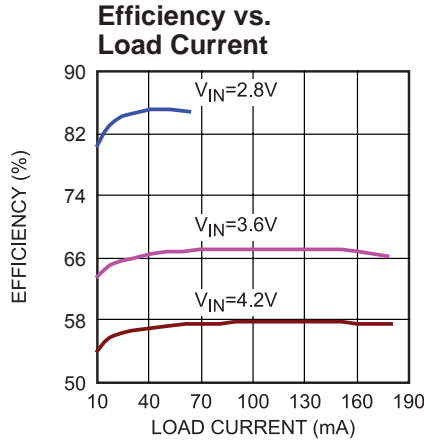
Parameter	Symbol	Condition	Min	Typ	Max	Units	
Input Supply Voltage	V_{IN}		2.8		5	V	
Output Voltage	V_{OUT}	$V_{IN}>3.2V$, $I_{OUT}<110mA$		4.8	5	5.2	V
			$T_A=25^{\circ}C$ $-40^{\circ}C \leq T_A \leq +85^{\circ}C$	4.6	5	5.2	
Quiescent Current	I_Q	$I_{OUT}=0$		2	4	mA	
Maximum Output Current	I_O	$V_{IN}>3.2V$	110			mA	
Over Current Protection	I_{OCP}	$V_{OUT}=5V$	250	350	500	mA	
Short Circuit Protection	I_{SHORT}	$T_A=25^{\circ}C$		60	90	mA	
		$-40^{\circ}C \leq T_A \leq +85^{\circ}C$		60	150		
Output Ripple		$I_{OUT}=60mA$		30		mV	
Shut Down Current	I_{SHDN}	$V_{IN}=4.5V$, $V_{EN}<0.4V$		0.1	1	μA	
Operation Frequency	F_{OSC}		1.1	1.35	1.6	MHz	
Enable Voltage, High	V_{EN} (HIGH)			1.5		V	
Enable Voltage, Low	V_{EN} (LOW)			0.4		V	
Enable Pin Leakage	I_{EN}	$V_{EN}=5V$		0.2	1	μA	

PIN FUNCTIONS

Pin #	Name	Description
1	OUT	Output Voltage. Decoupled with a 2.2 μ F ceramic capacitor for a load current less than 60mA. For a load current greater than 60mA, use 10 μ F decoupling capacitor.
2	GND	Ground.
3	EN	Device Enable: A logic high input ($V_{EN}>1.5V$) turns on the regulator. A logic low input ($V_{EN}>0.4V$)
4	CN	Flying Capacitor Negative Terminal.
5	IN	Input.
6	CP	Flying Capacitor Positive Terminal.

TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN}=3.7V$, $V_{OUT}=5V$, $C1=C2=2.2\mu F$, $C3=0.47\mu F$. $T_A=25^\circ C$, unless otherwise noted.

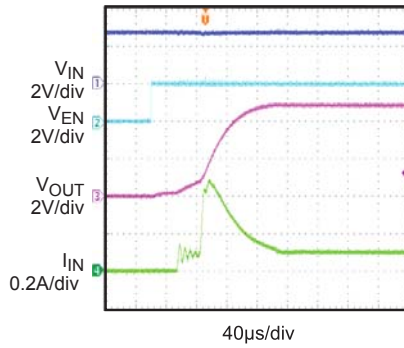


TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN}=3.7V$, $V_{OUT}=5V$, $C1=C2=2.2\mu F$, $C3=0.47\mu F$. $T_A=25^\circ C$, unless otherwise noted. (continued)

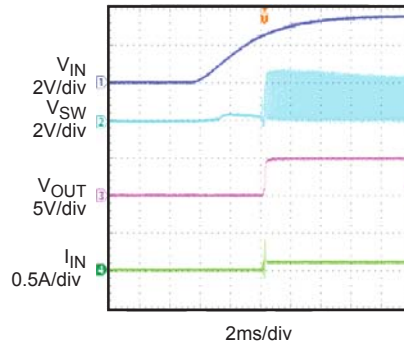
Inrush Current

$V_{IN}=2.8V$, $I_{OUT}=64mA$
with resistor load



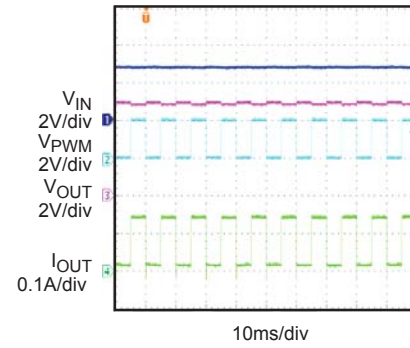
Inrush Current

$V_{GN}=V_{IN}=3.6V$, $I_{OUT}=64mA$
with resistor load



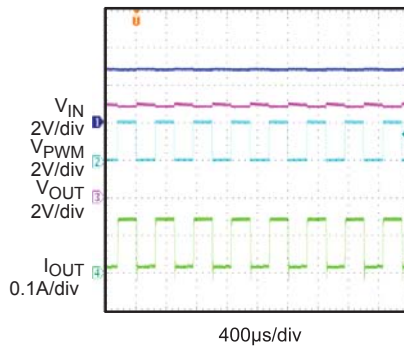
Load PWM Dimming Operation

$V_{EN}=V_{IN}=2.8V$, $F_{PWM}=100HZ$



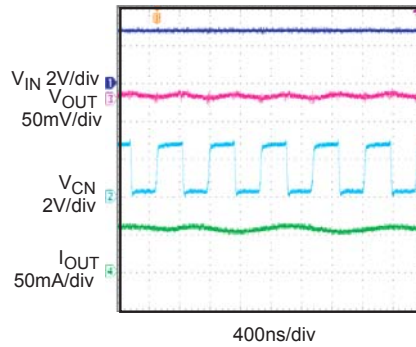
Load PWM Dimming Operation

$V_{EN}=V_{IN}=2.8V$, $F_{PWM}=2KHZ$



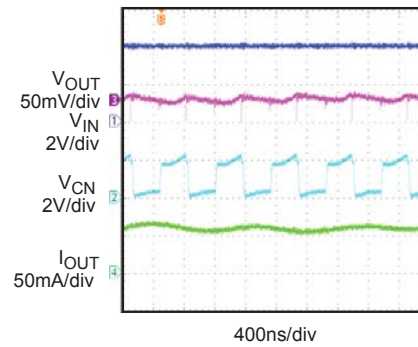
Normal Load Ripple

$V_{EN}=V_{IN}=2.8V$, $V_{OUT}=5V$, $I_{OUT}=60mA$



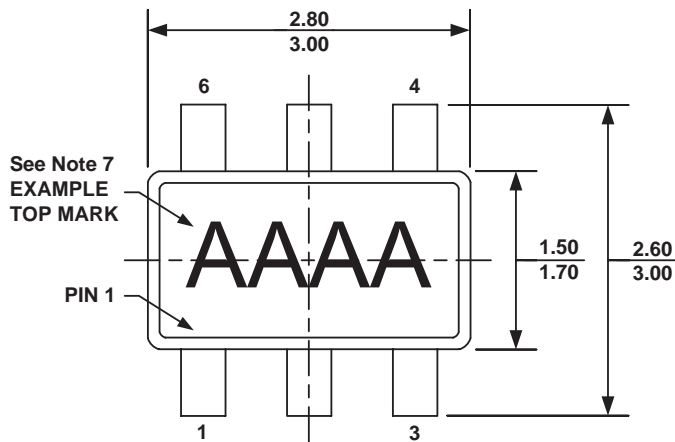
Normal Load Ripple

$V_{IN}=V_{EN}=4V$, $I_{OUT}=60mA$

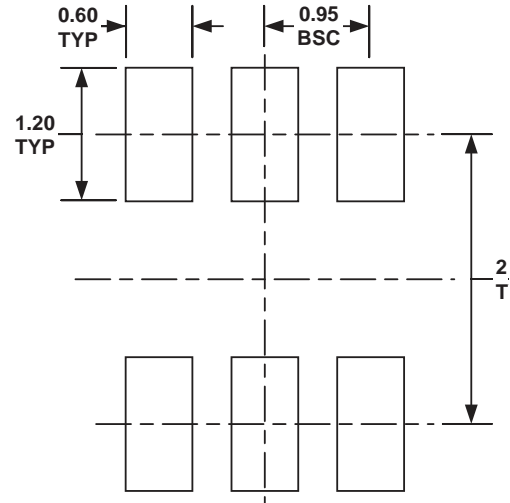


PACKAGE INFORMATION

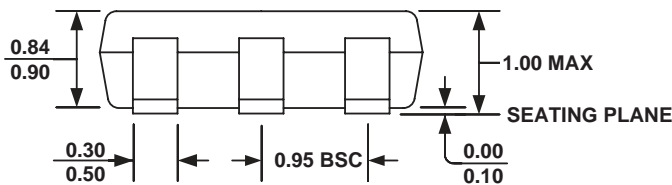
TSOT23-6



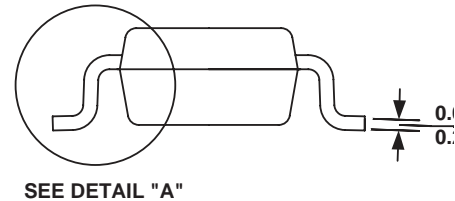
TOP VIEW



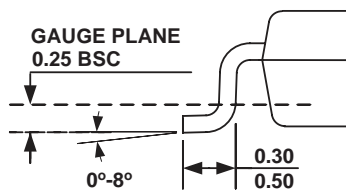
RECOMMENDED LAND PATTERN



FRONT VIEW



SIDE VIEW



DETAIL A

NOTE:

- 1) ALL DIMENSIONS ARE IN MILLIMETERS.
- 2) PACKAGE LENGTH DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR.
- 3) PACKAGE WIDTH DOES NOT INCLUDE INTERLEAD FL OR PROTRUSION.
- 4) LEAD COPLANARITY (BOTTOM OF LEADS AFTER FORMING) SHALL BE 0.10 MILLIMETERS MAX.
- 5) DRAWING CONFORMS TO JEDEC MO-193, VARIATION 6).
- 6) DRAWING IS NOT TO SCALE.
- 7) PIN 1 IS LOWER LEFT PIN WHEN READING TOP MARK LEFT TO RIGHT, (SEE EXAMPLE TOP MARK)

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