600kHz/1.2MHz PWM Step-Up Regulator

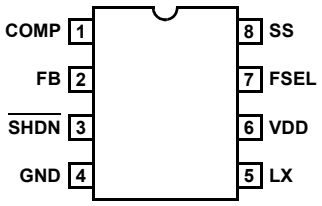
The EL7516 is a high frequency, high efficiency step-up voltage regulator operated at constant frequency PWM mode. With an internal 1.5A, 200mΩ MOSFET, it can deliver up to 600mA output current at over 90% efficiency. The selectable 600kHz and 1.2MHz allows smaller inductors and faster transient response. An external compensation pin gives the user greater flexibility in setting frequency compensation allowing the use of low ESR Ceramic output capacitors.

When shut down, it draws < 10µA of current and can operate down to 2.5V input supply. These features along with 1.2MHz switching frequency makes it an ideal device for portable equipment and TFT-LCD displays.

The EL7516 is available in an 8-pin MSOP package with a maximum height of 1.1mm. The device is specified for operation over the full -40°C to +85°C temperature range.

Pinout

EL7516
(8-PIN MSOP)
TOP VIEW



Features

- > 90% efficiency
- 1.6A, 200mΩ power MOSFET
- V_{IN} > 2.5V
- 600kHz/1.2MHz switching frequency selection
- Adjustable soft-start
- Internal thermal protection
- 1.1mm max height 8-pin MSOP package
- Pb-free Available

Applications

- TFT-LCD displays
- DSL modems
- PCMCIA cards
- Digital cameras
- GSM/CDMA phones
- Portable equipment
- Hand-held devices

Ordering Information

PART NUMBER	PACKAGE	TAPE & REEL	PKG. DWG. #
EL7516IYZ (See Note)	8-Pin MSOP (Pb-free)	-	MDP0043
EL7516IYZ-T7 (See Note)	8-Pin MSOP (Pb-free)	7”	MDP0043
EL7516IYZ-T13 (See Note)	8-Pin MSOP (Pb-free)	13”	MDP0043

NOTE: Intersil Pb-free products employ special Pb-free material sets; molding compounds/die attach materials and 100% matte tin plate termination finish, which is compatible with both SnPb and Pb-free soldering operations. Intersil Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J Std-020B.

Absolute Maximum Ratings (T_A = 25°C)

LX to GND 18V
V_{DD} to GND. 6V
COMP, FB, $\overline{SHDN}$, SS, FSEL to GND . . . . . -0.3V to (V_{DD} +0.3V)

Storage Temperature . . . . . .-65°C to +150°C
Operating Ambient Temperature . . . . . .-40°C to +85°C
Operating Junction Temperature . . . . . .+135°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

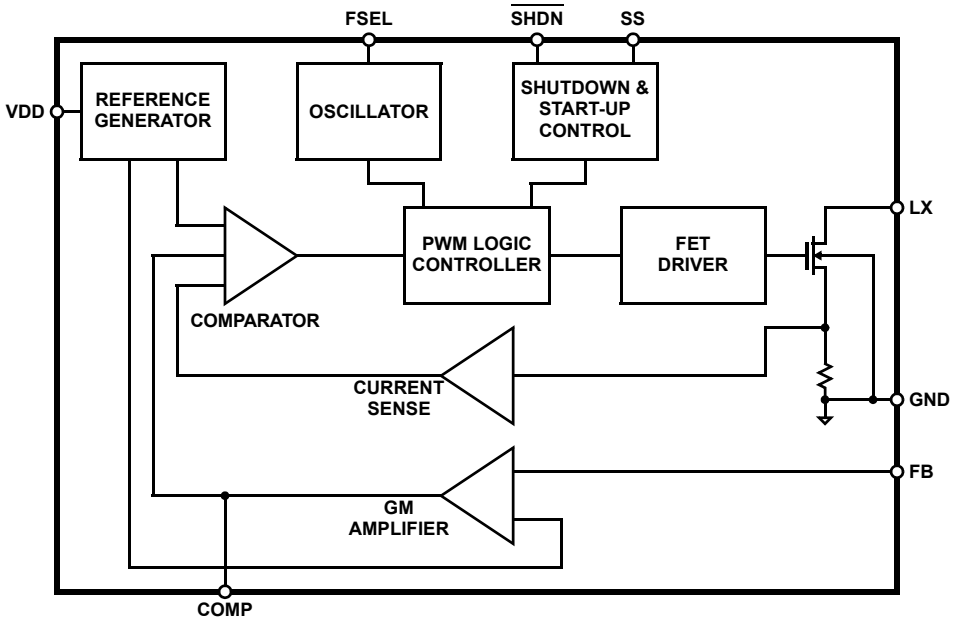
IMPORTANT NOTE: All parameters having Min/Max specifications are guaranteed. Typical values are for information purposes only. Unless otherwise noted, all tests are at the specified temperature and are pulsed tests, therefore: $T_J = T_C = T_A$

Electrical Specifications

V_{IN} = 3.3V, V_{OUT} = 12V, I_{OUT} = 0mA, FSEL = GND, T_A = 25°C unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNIT
IQ1	Quiescent Current - Shut-down	$\overline{SHDN}$ = 0V		0.6	10	µA
IQ2	Quiescent Current - Not Switching	$\overline{SHDN}$ = V_{DD}, FB = 1.3V		0.7		mA
IQ3	Quiescent Current - Switching	$\overline{SHDN}$ = V_{DD}, FB = 1.0V		1.3	2	mA
V_{FB}	Feedback Voltage		1.272	1.294	1.309	V
I_{B-FB}	Feedback Input Bias Current			0.01	0.5	µA
V_{DD}	Start-Up Input Voltage Range		2.6		5.5	V
D_{MAX}-600kHz	Maximum Duty Cycle	FSEL = 0V	84	90		%
D_{MAX}-1.2MHz	Maximum Duty Cycle	FSEL = V_{DD}	84	90		%
I_{LIM}	Current Limit - Max Peak Input Current		1.3	1.5		A
$I_{\overline{SHDN}}$	Shut-down Input Bias Current	$\overline{SHDN}$ = 0V		0.01	0.1	µA
R_{DS-ON}	Switch ON Resistance	V_{DD} = 2.7V, I_{LX} = 1A		0.2		Ω
$I_{LX-LEAK}$	Switch Leakage Current	VSW = 18V		0.01	3	µA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	3V < V_{IN} < 5.5V, V_{OUT} = 12V		0.1		%
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	V_{IN} = 3.3V, V_{OUT} = 12V, I_O = 30mA to 200mA		6.7		mV/A
F_{OSC1}	Switching Frequency Accuracy	FSEL = 0V	500	620	740	kHz
F_{OSC2}	Switching Frequency Accuracy	FSEL = V_{DD}	1000	1250	1500	kHz
V_{IL}	$\overline{SHDN}$, FSEL Input Low Level				0.5	V
V_{IH}	$\overline{SHDN}$, FSEL Input High Level		2.7			V
G_M	Error Amp Tranconductance	ΔI = 5µA	90	130	170	1µ/Ω
A_V	Voltage Gain			350		V/V
V_{DD-ON}	V_{DD} UVLO On Threshold		2.40	2.51	2.60	V
V_{DD-OFF}	V_{DD} UVLO Off Threshold		2.20	2.30	2.40	V
I_{SS}	Soft-start Charge Current		4	6	8	µA
R_{CS}	Current Sense Transresistance			0.08		V/A

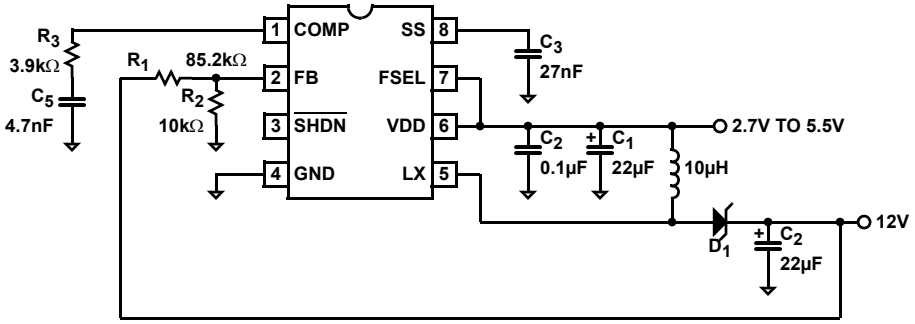
Block Diagram



Pin Descriptions

PIN NUMBER	PIN NAME	DESCRIPTION
1	COMP	Compensation pin. Output of the internal error amplifier. Capacitor and resistor from COMP pin to ground.
2	FB	Voltage feedback pin. Internal reference is 1.263V nominal. Connect a resistor divider from V_{OUT}. V_{OUT} = 1.26V (1 + R_1 / R_2). See Typical Application Circuit.
3	$\overline{SHDN}$	Shutdown control pin. Pull $\overline{SHDN}$ low to turn off the device.
4	GND	Analog and power ground.
5	LX	Power switch pin. Connected to the drain of the internal power MOSFET.
6	VDD	Analog power supply input pin.
7	FSEL	Frequency select pin. When FSEL is set low, switching frequency is set to 600kHz. When connected to high or V_{DD}, switching frequency is set to 1.2MHz.
8	SS	Soft-start control pin. Connect a capacitor to control the converter start-up.

Typical Application Circuit



Typical Performance Curves

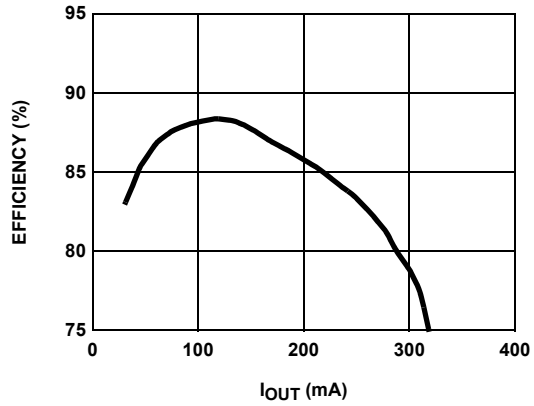


FIGURE 1. EFFICIENCY - 3.3V V_{IN} TO 12V V_{OUT} @ 1.3MHz

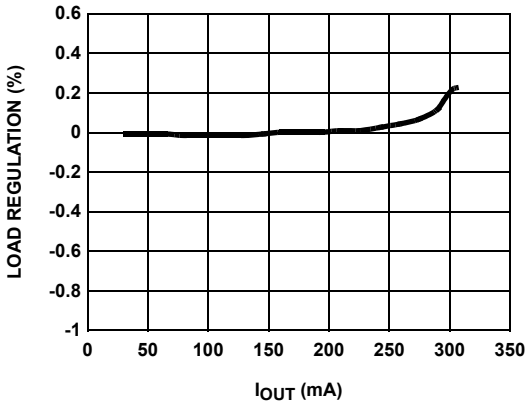


FIGURE 2. LOAD REGULATION - 3.3V V_{IN} TO 12V V_{OUT} @ 1.3MHz

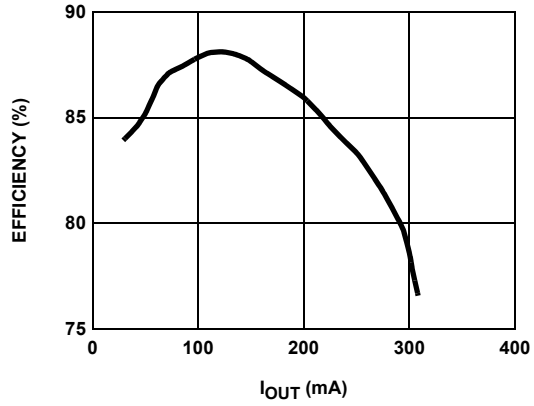


FIGURE 3. EFFICIENCY - 3.3V V_{IN} TO 12V V_{OUT} @ 620kHz

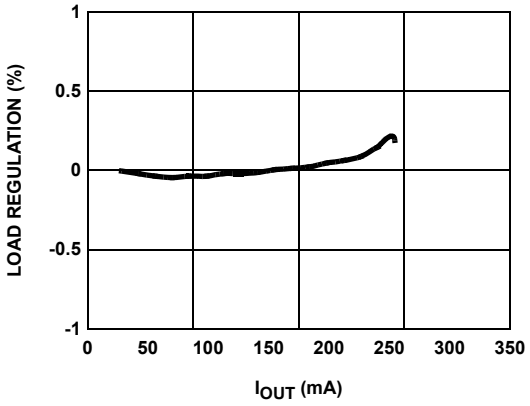


FIGURE 4. LOAD REGULATION - 3.3V V_{IN} TO 12V V_{OUT} @ 620kHz

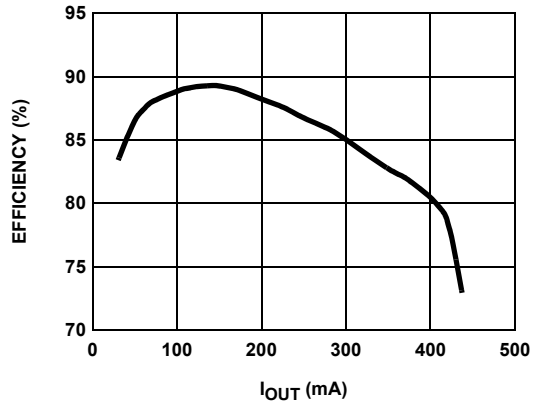


FIGURE 5. EFFICIENCY - 3.3V V_{IN} TO 9V V_{OUT} @ 1.2MHz

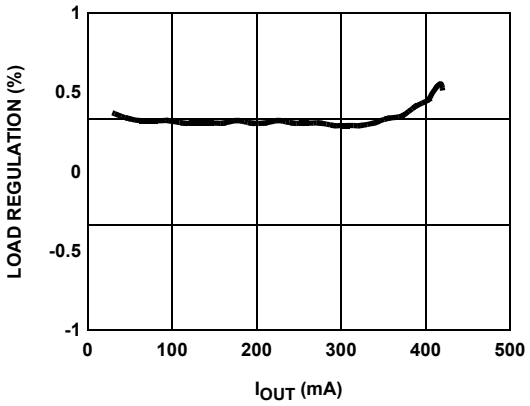


FIGURE 6. LOAD REGULATION - 3.3V V_{IN} TO 9V V_{OUT} @ 1.2MHz

Typical Performance Curves (Continued)

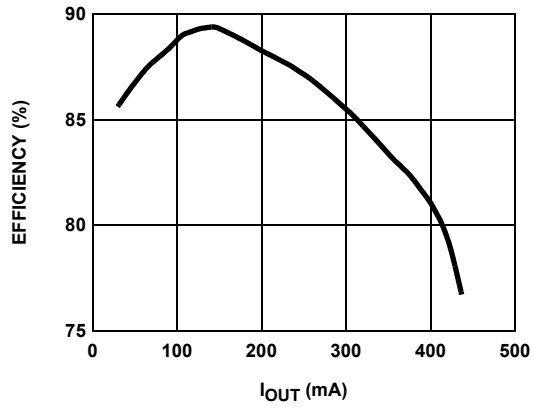


FIGURE 7. EFFICIENCY - 3.3V V_{IN} TO 9V V_{OUT} @ 600kHz

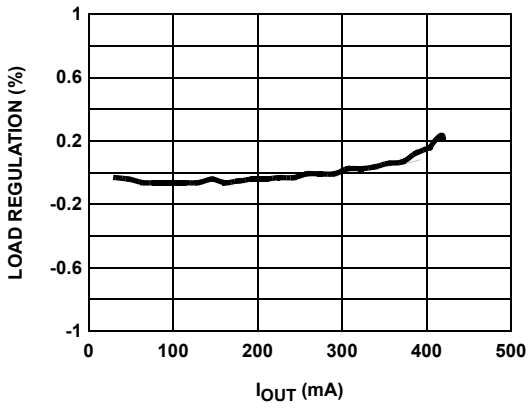


FIGURE 8. LOAD REGULATION - 3.3V V_{IN} TO 9V V_{OUT} @ 600kHz

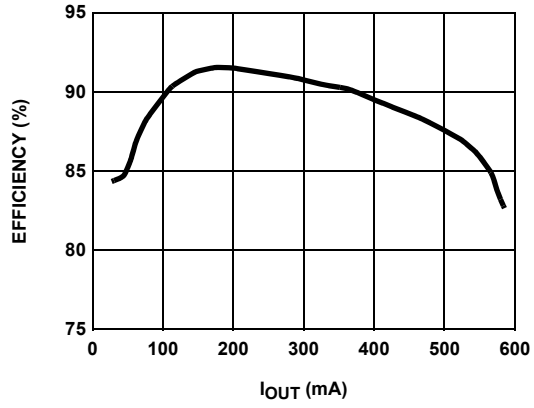


FIGURE 9. EFFICIENCY - 5V V_{IN} TO 12V V_{OUT} @ 1.2MHz

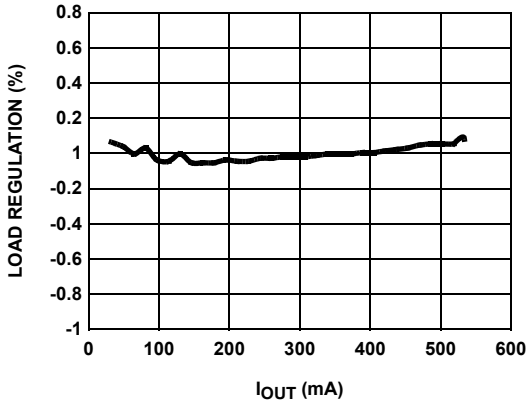


FIGURE 10. LOAD REGULATION - 5V V_{IN} TO 12V V_{OUT} @ 1.2MHz

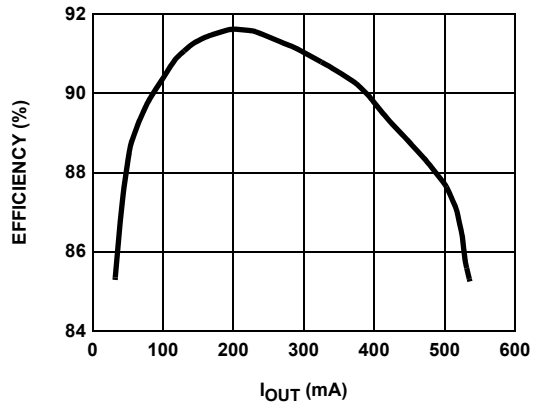


FIGURE 11. EFFICIENCY - 5V V_{IN} TO 12V V_{OUT} @ 600kHz

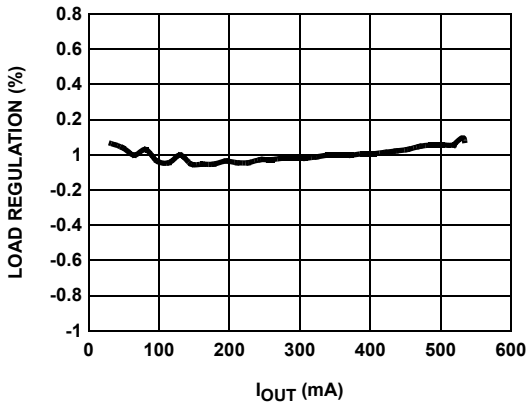


FIGURE 12. LOAD REGULATION - 5V V_{IN} TO 12V V_{OUT} @ 600kHz

Typical Performance Curves (Continued)

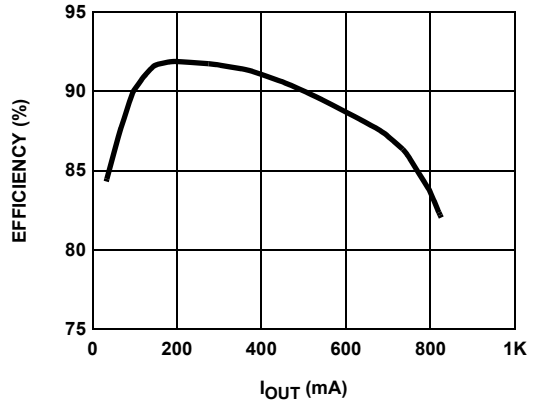


FIGURE 13. EFFICIENCY - 5V V_{IN} TO 9V V_{OUT} @ 1.2MHz

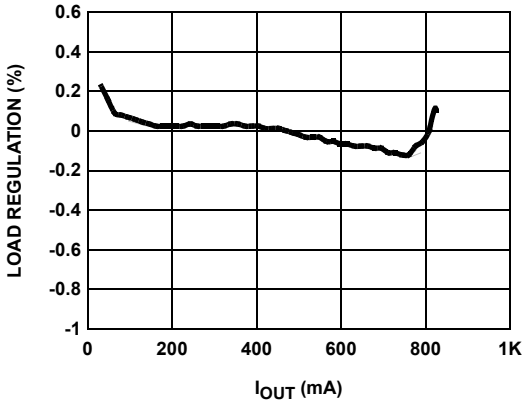


FIGURE 14. LOAD REGULATION - 5V V_{IN} TO 9V V_{OUT} @ 1.2MHz

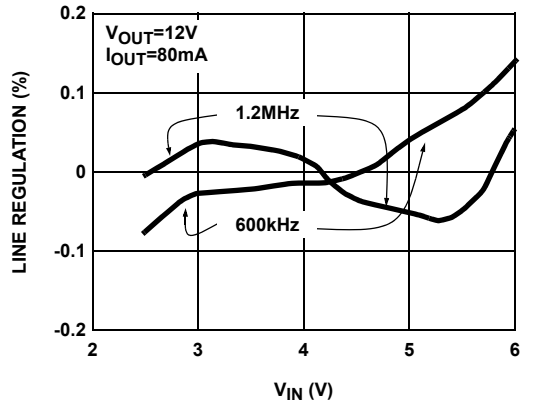


FIGURE 15. LINE REGULATION

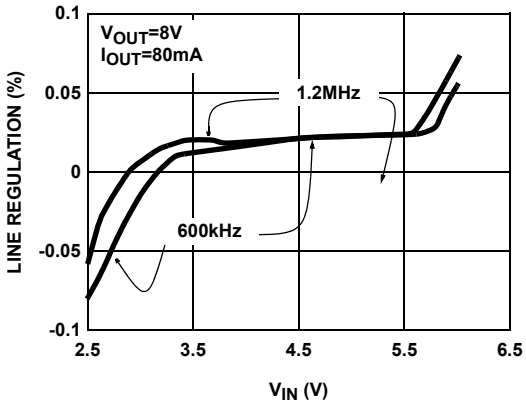


FIGURE 16. LINE REGULATION

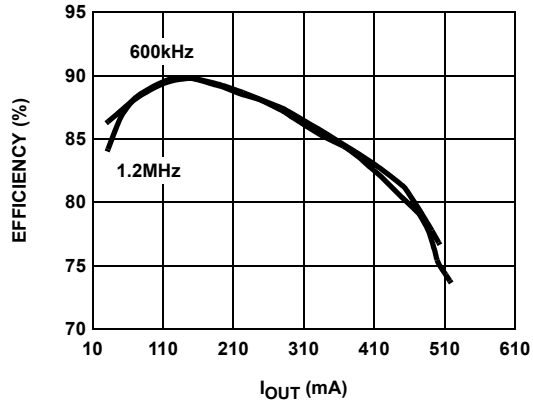


FIGURE 17. EFFICIENCY vs I_{OUT} - 3.3V TO 8V

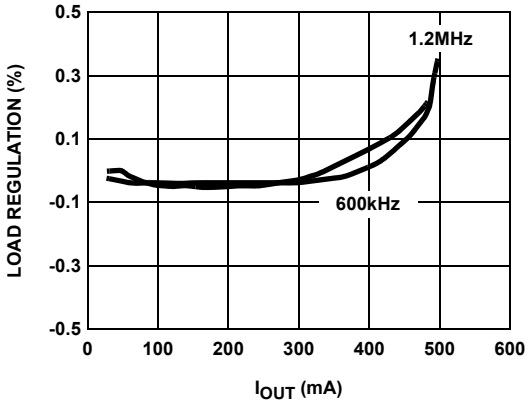


FIGURE 18. LOAD REGULATION - 3.3V TO 8V

Typical Performance Curves (Continued)

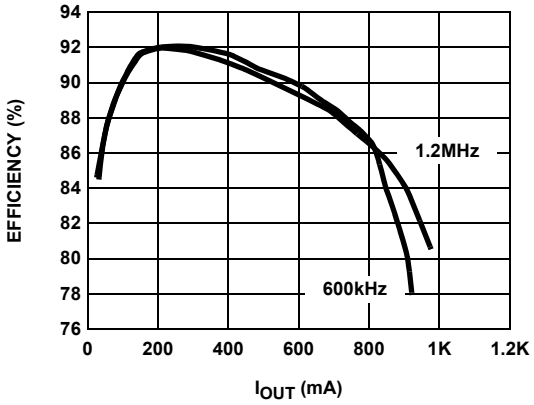


FIGURE 19. EFFICIENCY vs I_{OUT}

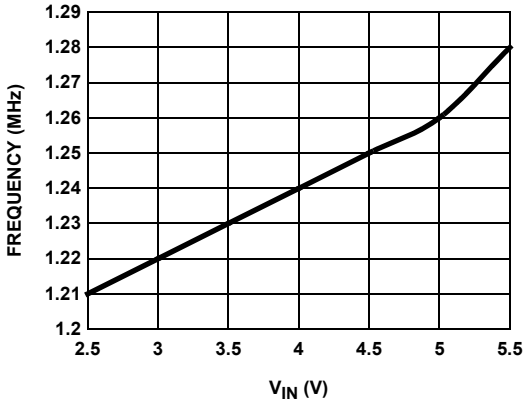


FIGURE 20. FREQUENCY (1.2MHz) vs V_{IN}

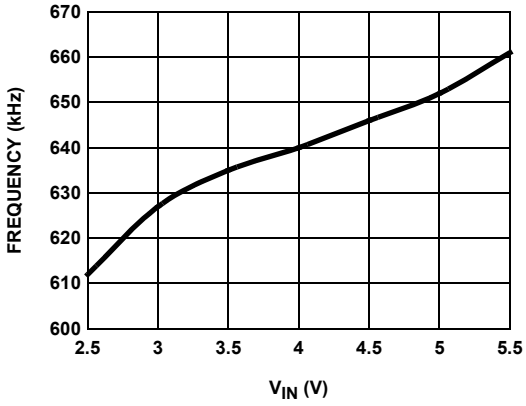


FIGURE 21. FREQUENCY (600kHz) vs V_{IN}

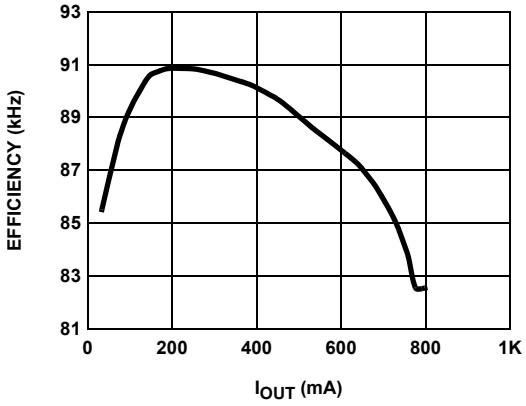


FIGURE 22. EFFICIENCY - 5V V_{IN} TO 9V V_{OUT} @ 600kHz

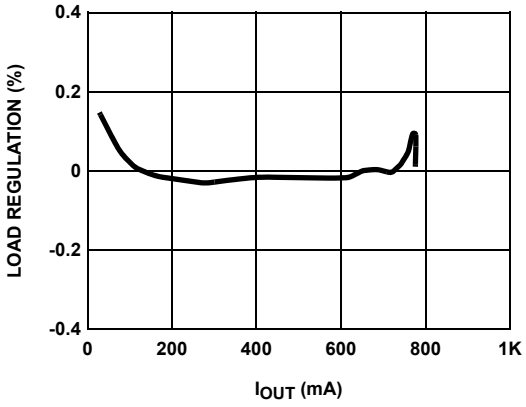


FIGURE 23. LOAD REGULATION - 5V V_{IN} TO 9V V_{OUT} @ 600kHz

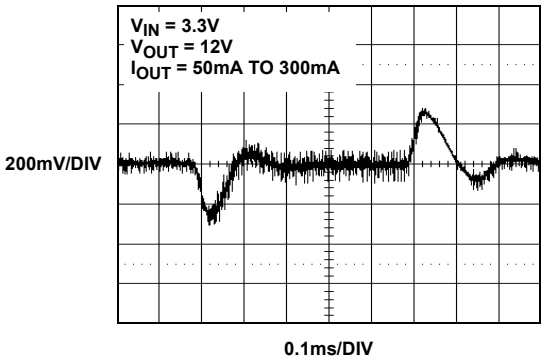


FIGURE 24. TRANSIENT REPONSE - 600kHz

Typical Performance Curves (Continued)

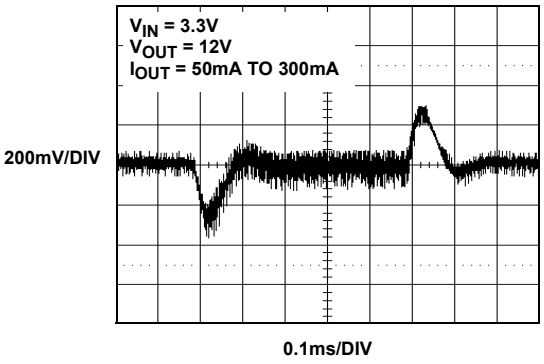


FIGURE 25. TRANSIENT RESPONSE - 1.2MHz

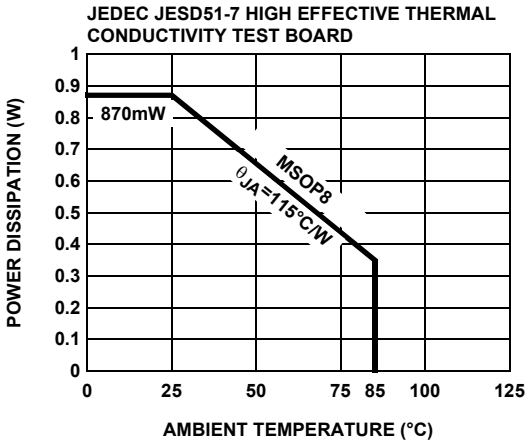


FIGURE 26. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

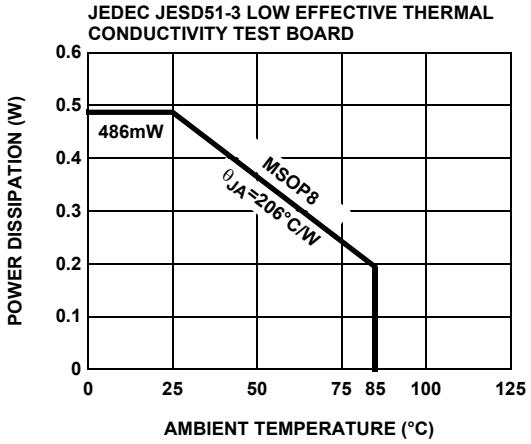


FIGURE 27. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE