

# 1.7A, 1.5MHz Synchronous Step-Up DC/DC Converter with Output Disconnect

## FEATURES

- **High Efficiency:** Up to 95%
- **Inrush Current Limiting and Output Disconnect**
- **Programmable Output Voltages up to 6V**
- **1.5V to 6V Input Range**
- Programmable/Synchronizable Fixed Frequency Operation up to 1.5MHz
- Programmable Automatic Burst Mode® Operation
- Current Mode Control with Programmable Soft-Start Period and Peak Current Limit
- 0.2Ω N-Channel and 0.3Ω P-Channel Switches
- Ultralow Quiescent Currents: 12µA Sleep, <1µA in Shutdown
- 12-Pin 4mm × 3mm Thermally Enhanced DFN Package

## APPLICATIONS

- Point-of-Load Regulators
- USB VBUS Power
- Portable GPS
- MP3 Players

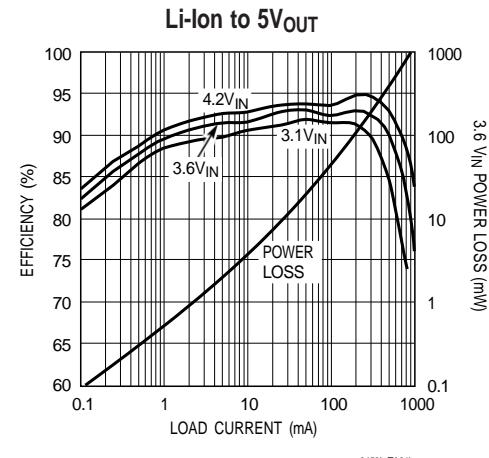
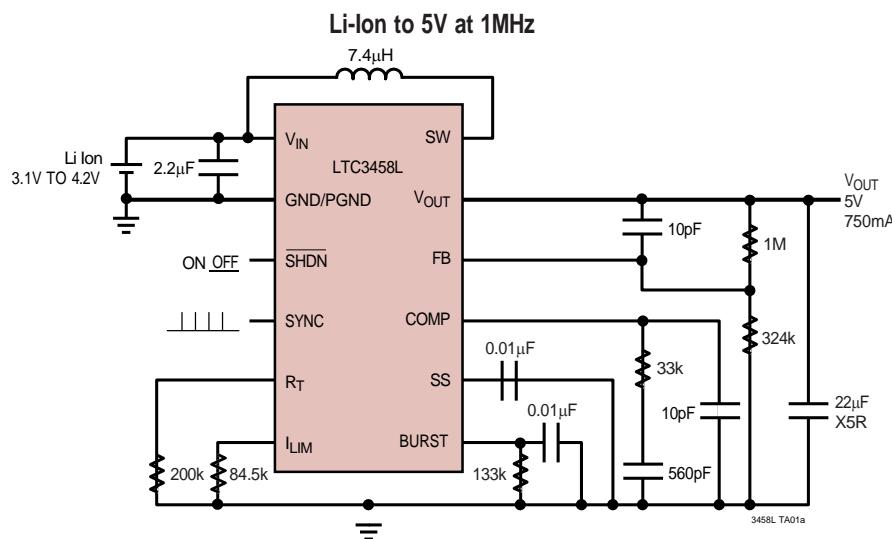
## DESCRIPTION

The LTC®3458L is a high efficiency, current mode, fixed frequency, step up DC/DC converter with true output disconnect and inrush current limiting. The LTC3458L is rated for up to 6V output and includes a 0.2Ω N-channel MOSFET switch and a 0.3Ω P-channel MOSFET synchronous rectifier. The LTC3458L is well suited for battery powered applications and includes programmable output voltage, switching frequency and loop compensation. The oscillator frequency can be set up to 1.5MHz or synchronized to an external clock.

Quiescent current is only 12µA during Burst Mode operation maximizing battery life in portable applications. The Burst Mode current threshold, peak current limit, and soft-start are externally programmable. Other features include <1µA shutdown current, antiringing control, and thermal limit. The LTC3458L is available in a low profile (0.75mm), 4mm × 3mm 12-pin DFN package.

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 Burst Mode is a registered trademark of Linear Technology Corporation.  
 All other trademarks are the property of their respective owners.  
 Protected by U.S. Patents including

## TYPICAL APPLICATION



## ABSOLUTE AXI M RATE GS

(Note 1)

- M**
- $V_{IN}$ , SS, SYNC Voltages ..... to 7V
  - BURST, SHDN,  $V_{OUT}$  Voltages ..... to 7V
  - Operating Temperature Range  
(Notes 2, 3) ..... 40°C to 85°C
  - Storage Temperature Range ..... 65°C to 125°C
  - SW Voltage
    - DC ..... V to 7V
    - Pulsed <100ns ..... V to 8V

## PACKAGE/ORDER INFORMATION

| TOP VIEW  | ORDER PART NUMBER        |
|---|--------------------------|
| <p>DE PACKAGE<br/>12-LEAD (4mm × 3mm) PLASTIC DFN<br/>EXPOSED PAD IS PGND (PIN 13),<br/>MUST BE SOLDERED TO PCB<br/><math>T_{JMAX} = 125^\circ\text{C}</math>, <math>\theta_{JA} = 45^\circ\text{C}/\text{W}</math></p> | LTC3458LEDE              |
|   | DE PART MARKING<br>3458L |

Consult LTC Marketing for parts specified with wider operating temperature ranges.

## ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at  $T_A = 25^\circ\text{C}$ .  $V_{IN} = 3.3\text{V}$ ,  $V_{OUT} = 5\text{V}$ ,  $R_T = 200\text{k}$ , unless otherwise noted.

| PARAMETER                                | CONDITIONS  | MIN          | TYP      | MAX  | UNITS                  |
|--|---|--------------|----------|------|------------------------|
| Minimum $V_{IN}$ Operating Voltage       | $T_A = 0^\circ\text{C}$ to $85^\circ\text{C}$<br>$T_A = -40^\circ\text{C}$ to $0^\circ\text{C}$               |              | 1.4      | 1.5  | V                      |
| Output Voltage Adjust Range              |   | ●            | 2        | 6    | V                      |
| Feedback Voltage                         | $0^\circ\text{C}$ to $85^\circ\text{C}$ , $V_{OUT} = 3.3\text{V}$<br>$-40^\circ\text{C}$ to $0^\circ\text{C}$ | 1.21<br>1.20 | 1.225    | 1.25 | V                      |
| Undervoltage (Exit Burst Mode Operation) | Below Feedback Voltage  |              | -4       |      | %                      |
| Feedback Input Current                   | $V_{FB} = 1.23\text{V}$   |              | 1        | 50   | nA                     |
| Quiescent Current – Burst Mode Operation | $V_{IN}$ Current at $3.3\text{V}$<br>$V_{OUT}$ Current at $5\text{V}$   |              | 12<br>5  | 30   | $\mu\text{A}$          |
| Quiescent Current – Shutdown             | $V_{IN}$ Current at $3.3\text{V}$<br>$V_{OUT}$ Current at $0\text{V}$   |              | 0.5<br>1 | 1    | $\mu\text{A}$          |
| Quiescent Current – Active               | $V_{IN}$ Current Switching  |              | 1        | 3    | mA                     |
| NMOS Switch Leakage                      |   | ●            | 0.05     | 5    | $\mu\text{A}$          |
| PMOS Switch Leakage                      |   | ●            | 0.05     | 5    | $\mu\text{A}$          |
| NMOS Switch On Resistance                | $V_{OUT} = 5\text{V}$   |              | 0.2      |      | $\Omega$               |
| PMOS Switch On Resistance                | $V_{OUT} = 5\text{V}$   |              | 0.3      |      | $\Omega$               |
| Fixed NMOS Current Limit                 | $R_{ILIM} = 84.5\text{k}$   | ●            | 1.7      | 2.1  | A                      |
| Maximum Duty Cycle                       | $V_{IN} = 3.3\text{V}$ , $f_{OSC} = 1\text{MHz}$  | ●            | 80       | 90   | %                      |
| Minimum Duty Cycle                       |   | ●            |          | 0    | %                      |
| Frequency Accuracy                       | $R_T = 200\text{k}$   | ●            | 0.85     | 1    | 1.15                   |
| Error Amplifier Transconductance         |   |              | 60       |      | $\mu\text{A}/\text{V}$ |
| Error Amplifier Source Current           |   |              | 7        |      | $\mu\text{A}$          |
| Error Amplifier Sink Current             |   |              | 7        |      | $\mu\text{A}$          |
| SYNC Input High                          |   | ●            | 1.5      |      | V                      |
| SYNC Input Low                           |   | ●            | 0.35     |      | V                      |

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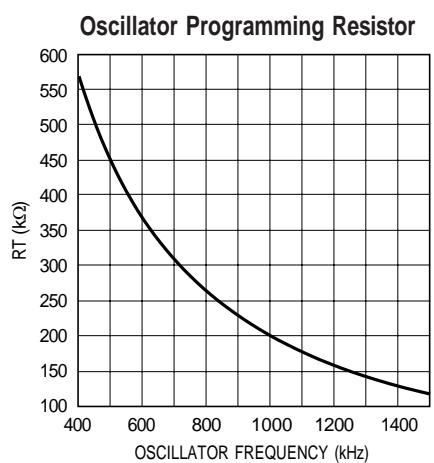
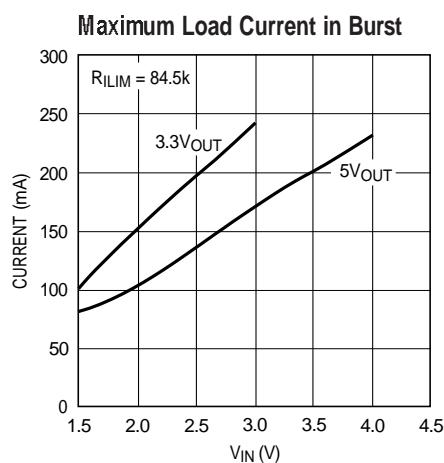
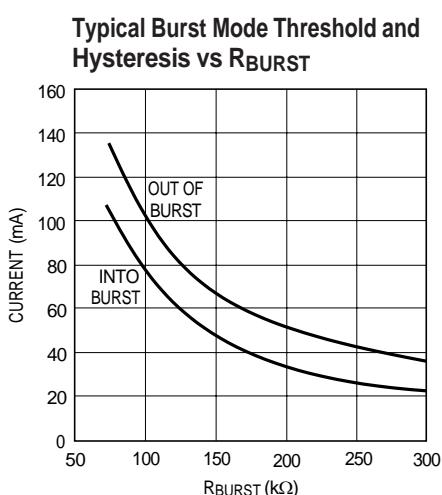
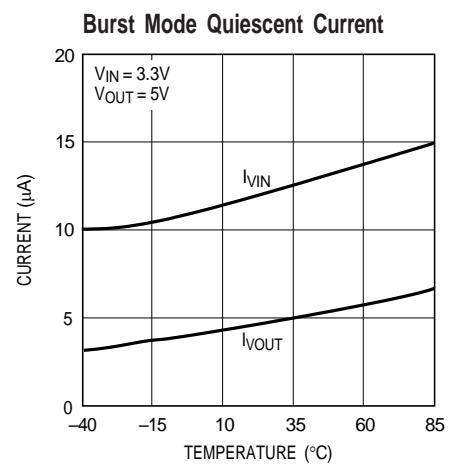
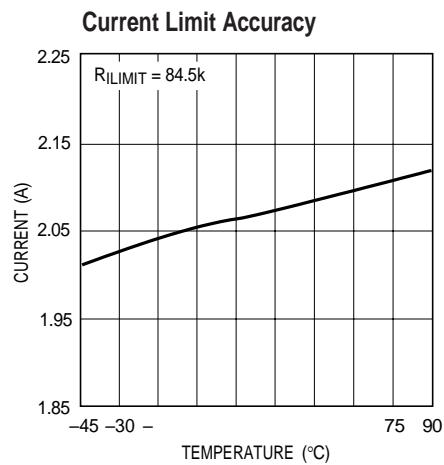
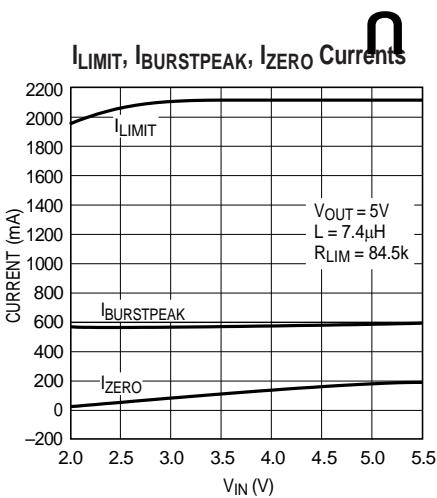
| PARAMETER                                   | CONDITIONS                | MIN | TYP  | MAX | UNITS |
|---|---------------------------|-----|------|-----|-------|
| SHDN Input High                             |                           | ●   | 1.25 |     | V     |
| SHDN Input Low                              |                           | ●   | 0.3  |     | V     |
| BURST Mode Peak Current ( $I_{BURSTPEAK}$ ) | $R_{ILIM} = 84.5\text{k}$ |     | 0.55 |     | A     |
| BURST Threshold Voltage                     |                           |     | 1.10 |     | V     |

**Note 1:** Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

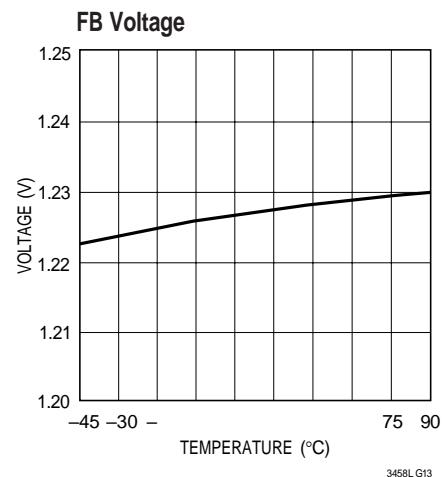
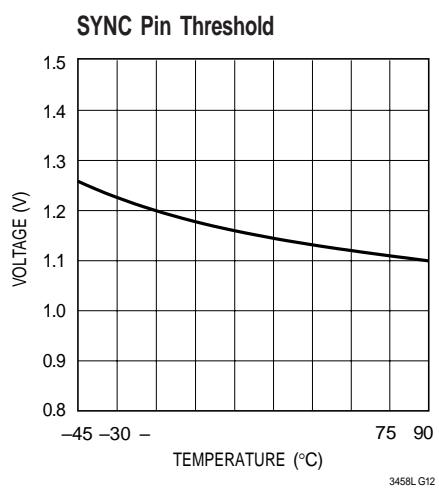
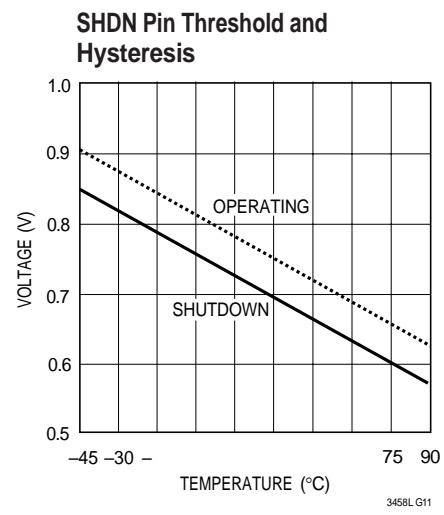
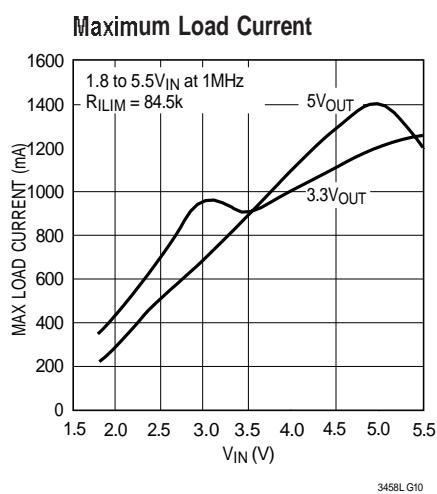
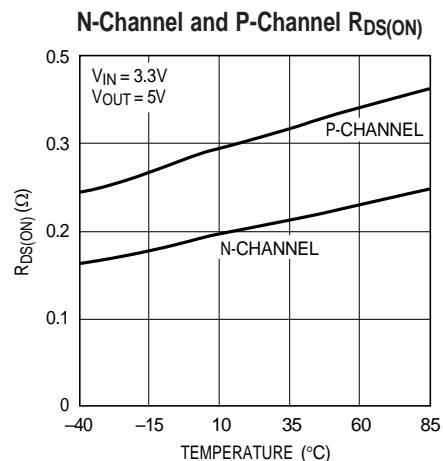
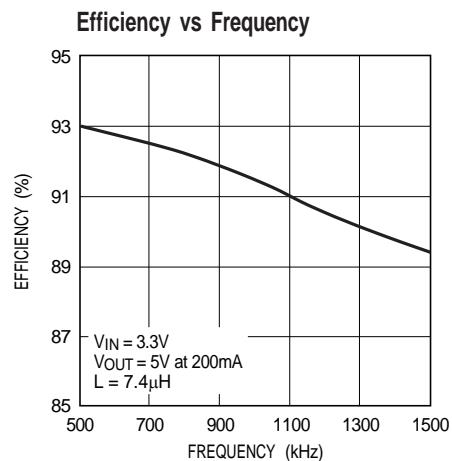
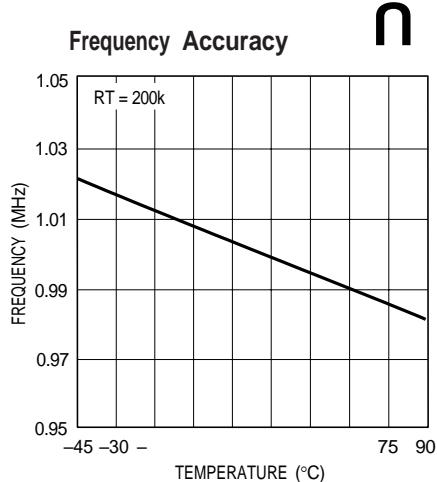
**Note 2:** This IC includes overtemperature protection that is intended to protect the device during momentary overload conditions. Junction temperature will exceed  $125^\circ\text{C}$  when overtemperature protection is active.

Continuous operation above the specified maximum operating junction temperature may impair device reliability.

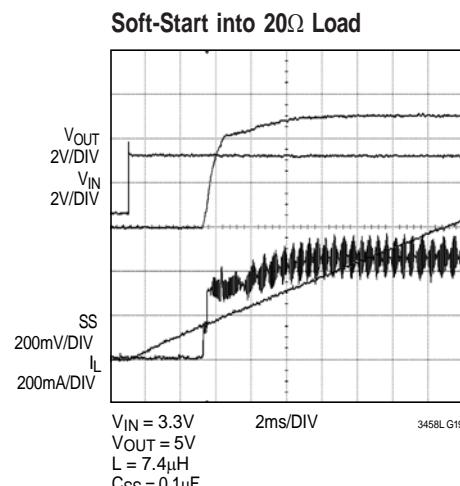
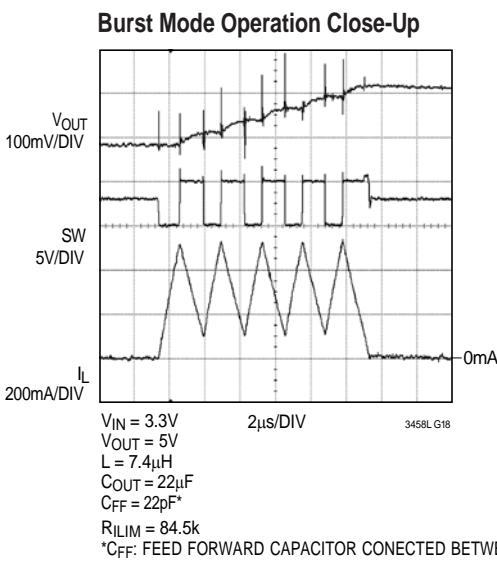
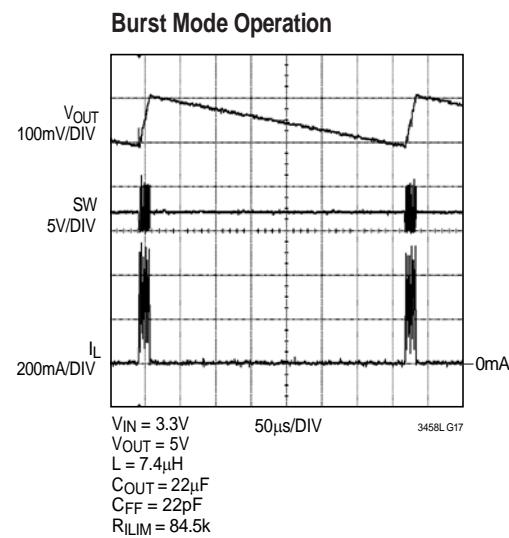
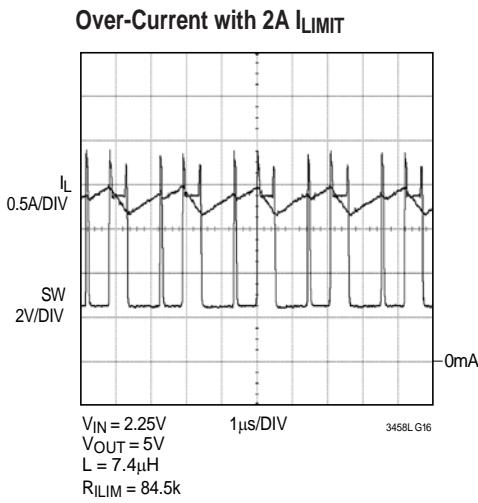
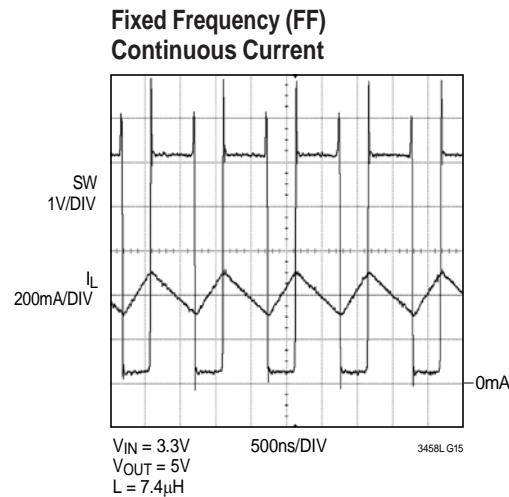
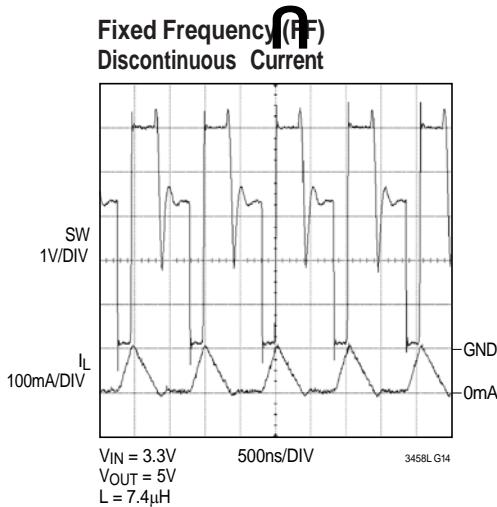
**Note 3:** The LTC3458LE is guaranteed to meet performance specifications from  $0^\circ\text{C}$  to  $70^\circ\text{C}$ . Specifications over the  $-40^\circ\text{C}$  to  $85^\circ\text{C}$  operating temperature range are assured by design, characterization and correlation with statistical process controls.

**TYPICAL PERFORMANCE CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise specified)

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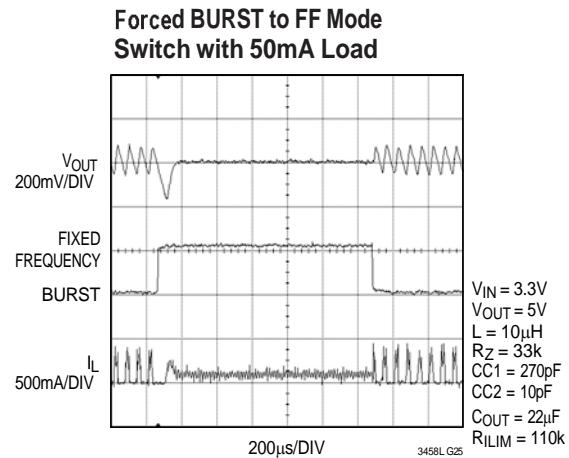
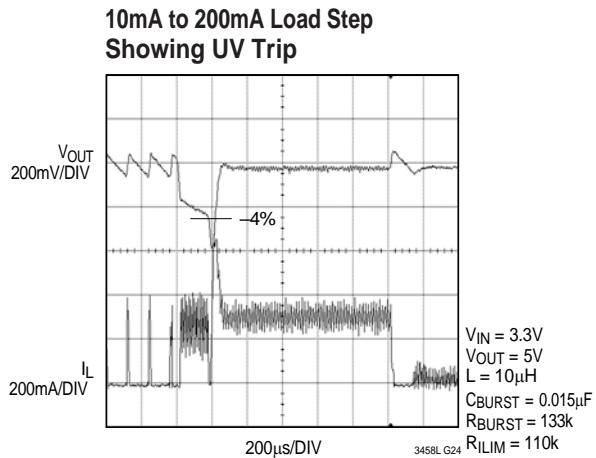
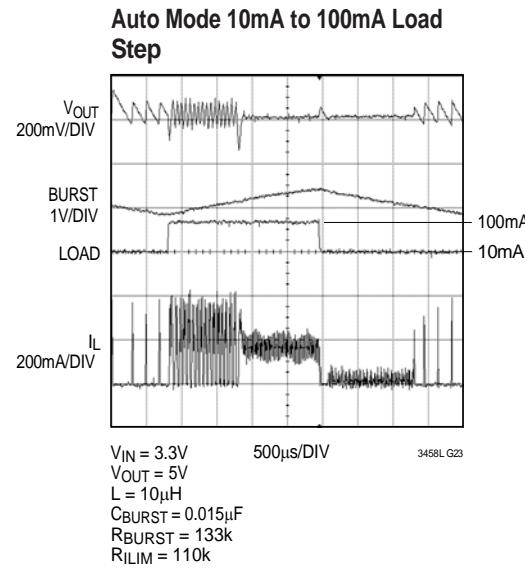
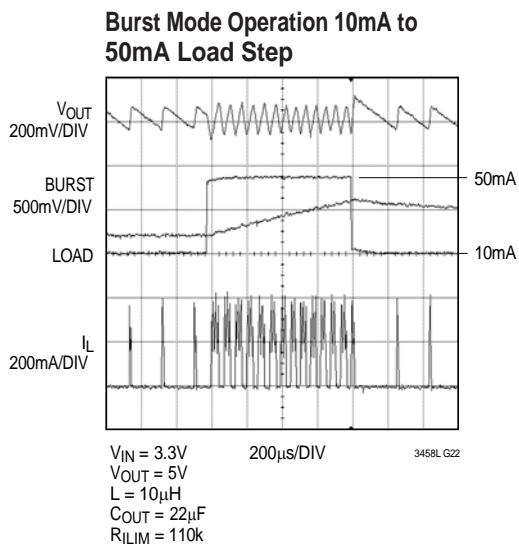
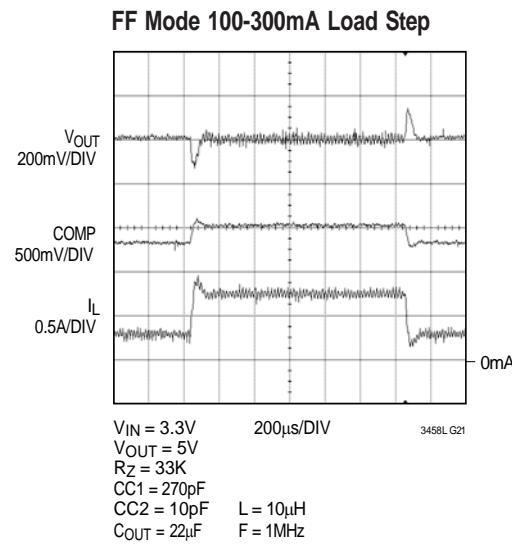
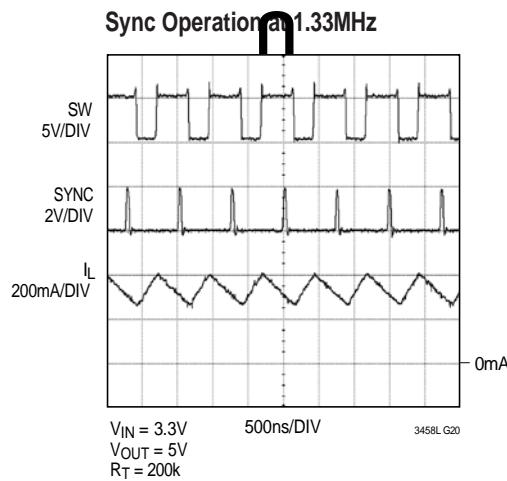


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\* $C_{FF}$ : FEED FORWARD CAPACITOR CONNECTED BETWEEN  $V_{OUT}$  AND FB.

## TYPICAL PERFORMANCE CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)



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