

# MAXIM

## MAX1653 Evaluation Kit

Evaluates: MAX1653/MAX1655

### General Description

The MAX1653 evaluation kit (EV kit) provides a +3.3V output voltage from a +4.5V to +28V input. It delivers up to 2A output current with greater than 95% efficiency, operates at 300kHz switching frequency, and has superior line- and load-transient response.

This EV kit can be used to evaluate other output voltages in the +2.5V to +5.5V range by changing feedback resistors R2 and R3. It can also be used to evaluate the MAX1655, which has a +1.0V to +5.5V output voltage range.

### Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	22 $\mu$ F, 35V, low-ESR tantalum capacitor AVX TPSE226M035R0300 or Sprague 593D226X0035E2W
C2, C4	1	0.1 $\mu$ F ceramic capacitor
C3	1	4.7 $\mu$ F, 16V tantalum capacitor Sprague 595D475X0016A2T
C5	1	0.33 $\mu$ F ceramic capacitor
C6	1	0.01 $\mu$ F ceramic capacitor
C7	1	220 $\mu$ F, 10V, low-ESR tantalum capacitor AVX TPSE227M010R0100 or Sprague 594D227X0010D2T
D1	1	100mA, 30V Schottky diode Central Semiconductor CMPSH-3
D2	1	0.5A, 30V Schottky diode Motorola MBR0530
L1	1	15 $\mu$ H inductor Sumida CDRH104-150, or Coiltronics UP2B-150, or Coilcraft D03316P-153
N1	1	Dual, 30V, N-channel MOSFET International Rectifier IRF 7303 or Fairchild NDS8936
R1	1	0.033 $\Omega$ , 1%, 1/2W resistor (2010) Dale WSL-2010-R033-F or IRC LR2010-R033-F
R2	0	Not installed
R3	1	100k $\Omega$ , 1% resistor
U1	1	MAX1653EEE
JU1–JU4	4	3-pin headers
None	4	Shunts
None	1	MAX1653 PC board
None	1	MAX1652–MAX1655 data sheet

### Features

- ◆ **+4.5V to +28V Input Voltage Range**
- ◆ **Selectable +3.3V or +5V Output Voltage**
- ◆ **+2.5V to +5.5V Adjustable Output (MAX1653)**  
**+1.0V to +5.5V Adjustable Output (MAX1655)**
- ◆ **2A Output Current**
- ◆ **3 $\mu$ A IC Shutdown Current**
- ◆ **300kHz Switching Frequency**
- ◆ **Surface-Mount Construction**
- ◆ **Fully Assembled and Tested**

### Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE
MAX1653EVKIT	0°C to +70°C	16 QSOP

**Note:** To evaluate the MAX1655, request a MAX1655EEE free sample when ordering the MAX1653EVKIT.

### Component Suppliers

SUPPLIER	PHONE	FAX
AVX	803-946-0690	803-626-3123
Central Semiconductor	516-435-1110	516-435-1824
Coilcraft	708-639-6400	708-639-1469
Coiltronics	561-241-7876	561-241-9339
Dale-Vishay	402-564-3131	402-563-6418
Fairchild	408-822-2000	408-822-2102
International Rectifier	310-322-3331	310-322-3332
IRC	512-992-7900	512-992-3377
Motorola	602-303-5454	602-994-6430
Sprague	603-224-1961	603-224-1430
Sumida	708-956-0666	708-956-0702
Taiyo Yuden	408-573-4150	408-573-4159
Vishay/Vitramon	203-268-6261	203-452-5670

**Note:** Please indicate that you are using the MAX1653 when contacting these component suppliers.

### Quick Start

The MAX1653V kit is fully assembled and tested. Follow these steps to verify board operation. **Do not turn on the power supply until all connections are completed.**

- 1) Connect a +4.5V to +28V supply voltage to the VIN pad. Connect ground to the GND pad.



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**For small orders, phone 408-737-7600 ext. 3468.**

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- 2) Connect a voltmeter and load, if any, to the VOUT pad.
- 3) Verify that the shunts are across JU1 pins 2 and 3, JU2 pins 1 and 2, JU3 pins 1 and 2, and JU4 pins 2 and 3.
- 4) Turn on the power supply to the board. Verify that the output voltage is +3.3V. For a +5V output, remove the shunt from JU3 pins 1 and 2 and place it across JU3 pins 2 and 3.
- 5) Refer to the *Evaluating Other Output Voltages* section to modify the board for different output voltages.

## Detailed Description

The MAX1653 provides a +3.3V output from a +4.5V to +28V input voltage. It delivers up to 2A output current and operates at 300kHz. Other output voltages can be programmed by feedback resistors R2 and R3. The MAX1653 EV kit uses a two-layer PC board optimized for compact design and best performance. Refer to the *Board Layout Considerations* section in the MAX1652–MAX1655 data sheet.

The EV kit's components are selected for 300kHz operation. To operate at other frequencies, component values might need to be changed (refer to the *Design Procedure* section in the MAX1652–MAX1655 data sheet). The oscillator can be synchronized to an external clock signal by driving the SYNC pad with a pulse train of 5V amplitude in the 190kHz to 340kHz frequency range. The 3-pin header JU4 selects either 150kHz or 300kHz switching frequency. Table 4 lists the selectable jumper options.

### Evaluating Other Output Voltages

To generate output voltages other than +3.3V or +5V in the +2.5V to +5.5V range, remove the shunt from the JU3 pins, and select the external voltage-divider resistors R2 and R3. Refer to the *Setting the Output Voltage* section in the MAX1652–MAX1655 data sheet for instructions on calculating R2 and R3 values. A 100k $\Omega$ , 1% resistor is provided at the R3 location to prevent the feedback pin (FB) from floating if no shunt is installed on JU3.

### Evaluating the MAX1655

To generate output voltages in the +1.0V to +5.5V range, replace the MAX1653 with the MAX1655, remove the shunt from the JU3 pins, and select the external voltage-divider resistors R2 and R3. Refer to the *Setting the Output Voltage* section in the MAX1652–MAX1655 data sheet for instructions on calculating R2 and R3 values.

For high-input-voltage and low-output-voltage combinations, you may need to operate at 150kHz with appropriate component changes (see the *Duty-Factor Limitation* section in the MAX1652–MAX1655 data sheet).

**Table 1. Jumper JU1 (Shutdown)**

SHUNT LOCATION	$\overline{\text{SHDN}}$ PIN	MAX1653 OUTPUT
1 and 2	Connected to GND	Shutdown mode, VOUT = 0V
2 and 3	Connected to VIN	MAX1653 enabled, VOUT = +3.3V or +5V

**Table 2. Jumper JU2 (Skip Mode)**

SHUNT LOCATION	$\overline{\text{SKIP}}$ PIN	MODE OF OPERATION
1 and 2	Connected to GND	Idle mode, pulse-skip-ping operation for highest light-load efficiency
2 and 3	Connected to VL	Low-noise mode, fixed 300kHz frequency PWM operation

**Table 3. Jumper JU3 (Output Voltage)**

SHUNT LOCATION	FB PIN	MAX1653 OUTPUT
1 and 2	Connected to GND	VOUT = +3.3V
2 and 3	Connected to VL	VOUT = +5V
Not installed	Connected to feedback resistors R2 and R3	VOUT = adjustable +2.5V to +5.5V range

**Table 4. Jumper JU4 (Switching Frequency)**

SHUNT LOCATION	SYNC PIN	FREQUENCY (kHz)
1 and 2	Connected to GND	150
2 and 3	Connected to REF	300
Not installed	Drive externally	190 to 340

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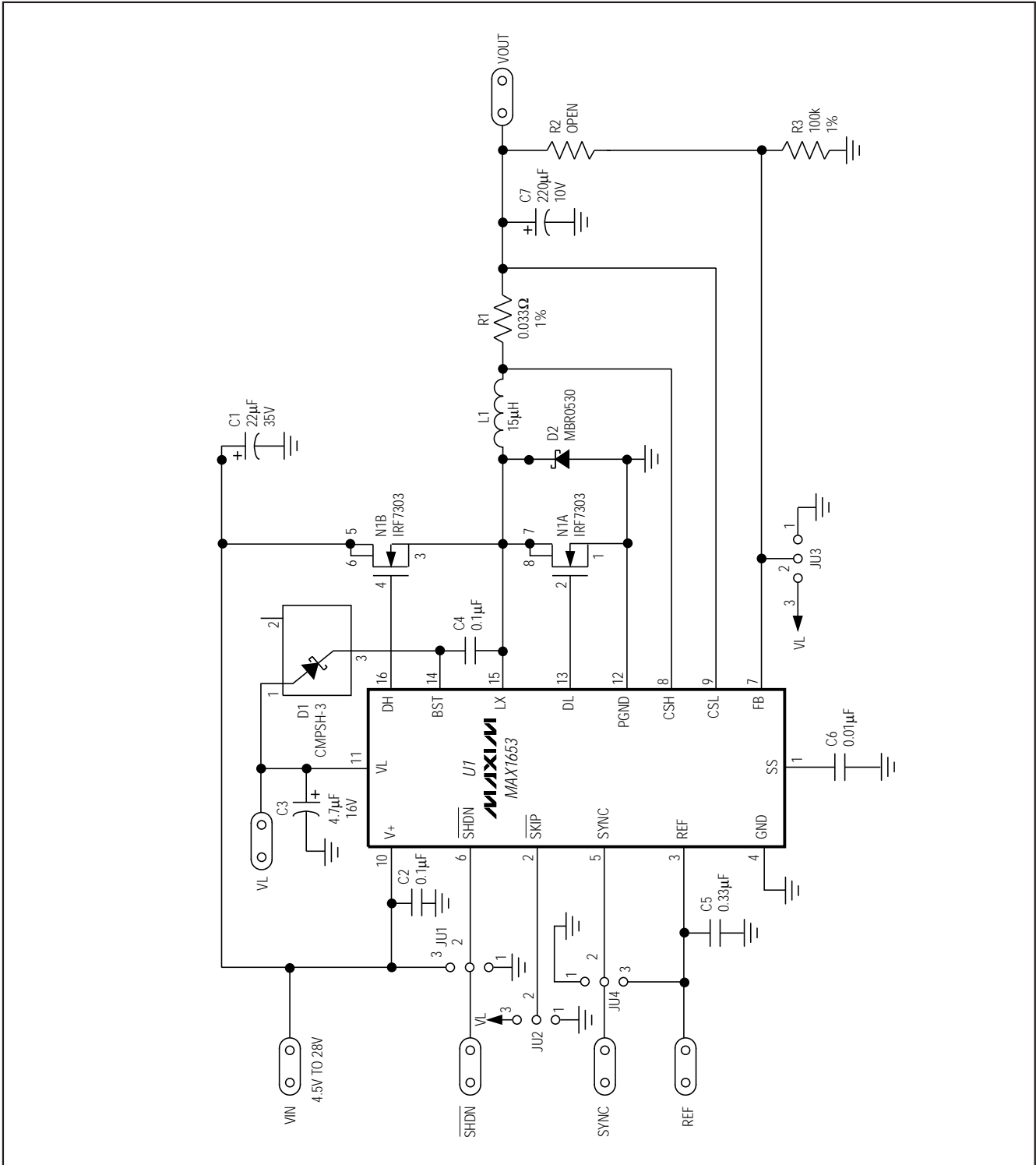


Figure 1. MAX1653 EV Kit Schematic

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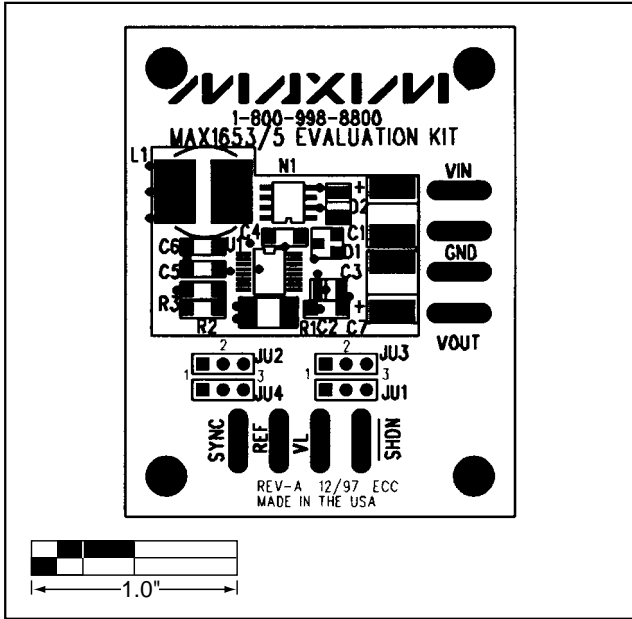


Figure 2. MAX1653 EV Kit Component Placement Guide—Component Side

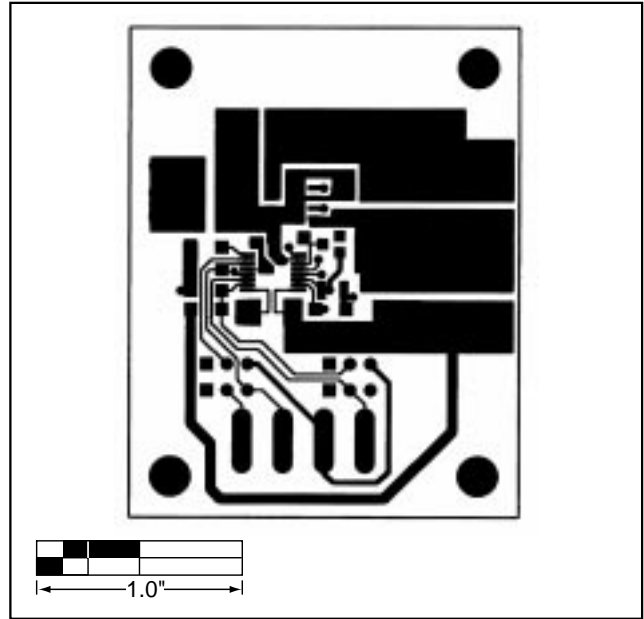


Figure 3. MAX1653 EV Kit PC Board Layout—Component Side

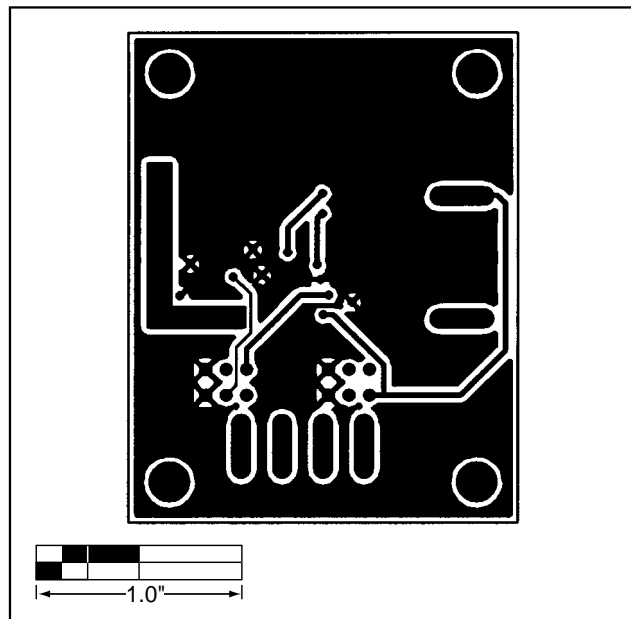


Figure 4. MAX1653 EV Kit PC Board Layout—Solder Side

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