EVNB675L-L-00A

24V, High Current Synchronous Buck Converter With +/-1.5A LDO and Buffed Reference

DESCRIPTION

The EVNB675L-L-00A is an evaluation board for the NB67LGL, the lower quiescent current version of NB675.

The Evaluation Board can deliver 10A continuous load current from a 4.7V to 22V input with excellent load and line regulation.

Constant-On-Time (COT) control mode provides fast transient response and eases loop stabilization.

The Evaluation Board can be turned on or shut down via a remote ON/OFF input that is reference to ground. This input is compatible with popular logic devices.

This part requires minimum number of external components and is available in QFN21 (3mmx4mm) package

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	4.7-22	V
Output Voltage	V_{OUT}	1.2	V
Output Current	I_{OUT}	10	A
Switching Frequency	f_{SW}	500	kHz

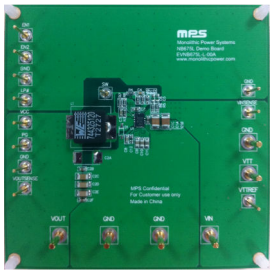
FEATURES

- Wide 4.7V to 24V Operating Input Range
- 10A Continous Output Current
- 12A Peak Output Current
- Built-in +/- 1.5A VTTLDO
- 105µA Quiescent Current
- Low R_{DS}(ON) Internal Power MOSFETs
- Proprietary Switching Loss Reduction Technique
- Internal Soft Start
- Output Discharge
- 500kHZ Switching Frequency for NB675L
- 750kHz Switching Frequency for NB675LH
- OCP, OVP, UVP Protection and Thermal Shutdown
- VDDQ Adjustable from 0.6V to 5.5V

APPLICATIONS

- Laptop Computer
- Tablet PC
- Networking Systems
- Server
- Personal Video Recorders
- Flat Panel Television and Monitors
- Distributed Power Systems

EVNB675L-L-00A EVALUATION BOARD

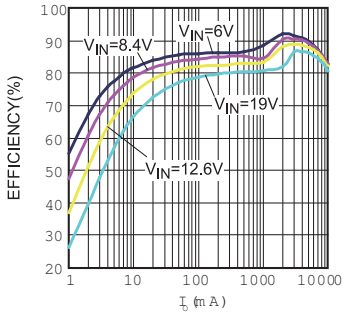


(L × W × H) 8.55cm × 8.55cm × 1.6cm

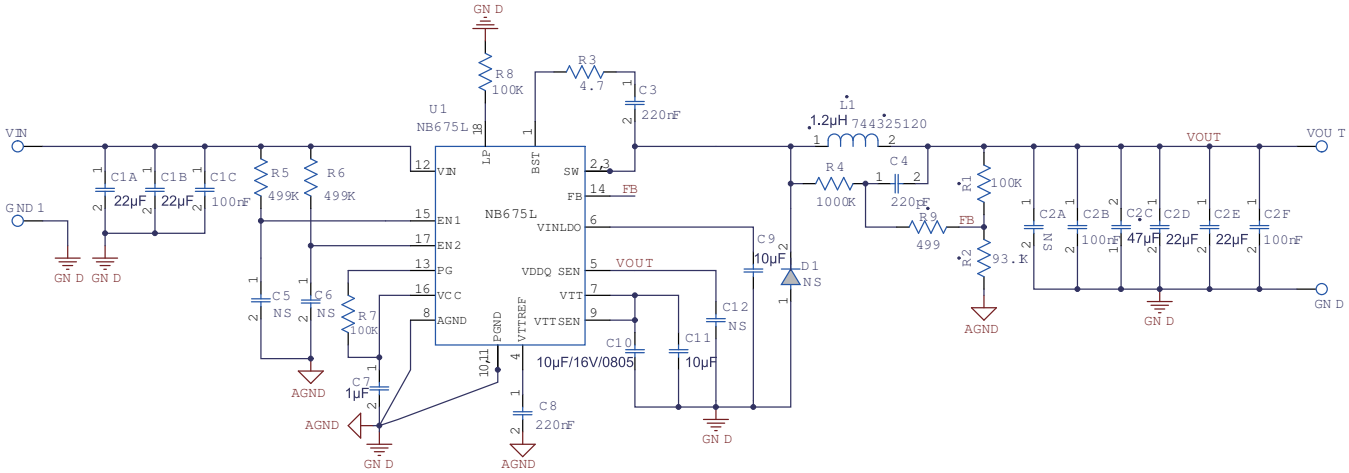
Board Number	MPS IC Number
EVNB675L-L-00A	NB675LGL

Efficiency vs. Load Current

V_O=1.2V, F_S=500kHz, L=1.2µH, DCR=2mΩ



EVALUATION BOARD SCHEMATIC



EVNB675L-L-00A BILL OF MATERIALS

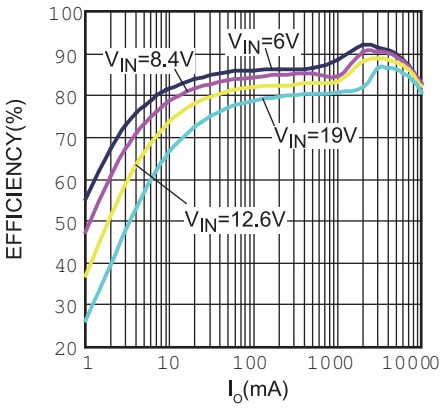
Qty	Ref	Value	Description	Package	Manufacture	Part Number
12	VTTREF, VOUTSENSE, VINSENSE, VCC,SW, PG,LP#, GND_VIN, GND_sen, GND3, EN2,EN1	VTTREF	Connector	CONN/1MM		
6	VTT,VOUT, VIN, GND_VTT, GND,GND2,	VTT	Connector	CONN/2MM		
1	D1	NS	Schottky Diode; 40V;0.5A	SOD-123		
1	R4	1M	Film Resistor;1%;	0603	Yageo	RC0603FR-071ML
3	C5, C6, C12	NS	Ceramic Capacitor; 16V;X7R;0603	0603		
2	R5, R6	499K	Film Resistor;1%;	0603	Yageo	RC0603FR-07499KL
1	R9	499	Film Resistor;1%	0603	Yageo	RC0603FR-07499RL
1	C2A	NS	6.3V;POSCAP	POSCAP		
1	C4	220pF	Ceramic Capacitor; 50V;X7R;0603;	0603	muRata	GRM188R71H221KA01D
2	C3, C8	220nF	Ceramic Capacitor; 16V;X7R;0603;	0603	muRata	GRM188R71C224KA01
3	C1C, C2B, C2F	100nF	CeramicCapacitor; 16V;X7R;0603;, Ceramic Capacitor; 50V;X7R;0603;	0603	muRata	GRM188R71C104KA01D, GRM188R71H104KA93D
3	R1, R7, R8	100K	Film Resistor;1%;	0603	Yageo	RC0603FR-07100KL
1	R2	93.1K	Film Resistor;1%	0603	Yageo	RC0603FR-0793K1L
1	C2C	47µF	Ceramic Capacitor; 6.3V;X5R;1206;	1206	muRata	JMK316BJ476ML-T
2	C1A, C1B	22µF	Ceramic Capacitor; 25V;X5R;1210;	1210	muRata	GRM32ER61E226KE15L
2	C2D, C2E	22µF	Ceramic Capacitor; 6.3V;X5R;1206	1206	muRata	GRM31CR60J226KE19
3	C9, C10, C11	10µF	Ceramic Capacitor; 16V;X7R	0805	Murata	GRM21BR61C106KE15
1	R3	4.7	Film Resistor;5%	0603	Yageo	RC0603JR-074R7L
1	L1	1.2µH	Inductor;1.2uH; 2m;25A	SMD	Wurth	744325120
1	C7	1µF	Ceramic Capacitor; 6.3V;X5R;0603	0603	muRata	GRM188R60J105KA01D
1	U1	NB675L	Synchronous Buck converter	QFN3*4	MPS	NB675LGL

EVB TEST RESULTS

Performance waveforms are tested on the EVNB675L-L-00A.
V_{IN} = 20V, V_{OUT} =1.2V, L = 1.2µH, T_A = 25°C, unless otherwise noted.

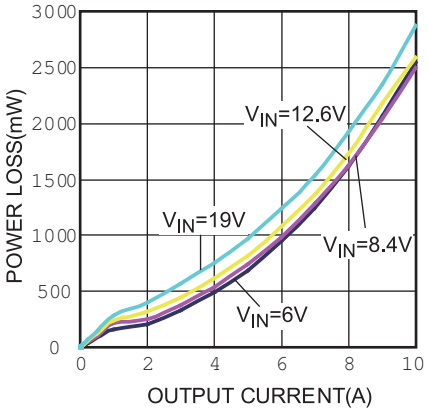
Efficiency vs. Load Current

V_O=1.2V, F_S=500kHz,
L=1.2µH, DCR=2mΩ



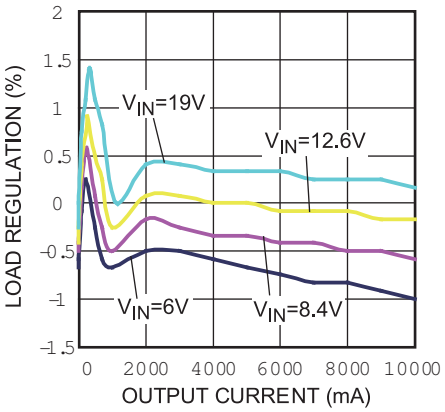
Power Loss vs. Load Current

V_O=1.2V, F_S=500kHz,
L=1.2µH, DCR=2mΩ



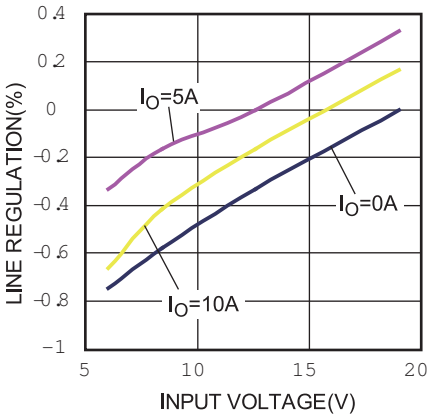
Load Regulation

V_O=1.2V, F_S=500kHz,
L=1.2µH, DCR=2mΩ



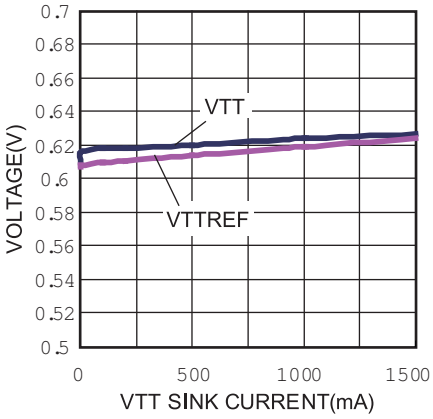
Line Regulation

V_O=1.2V, F_S=500kHz,
L=1.2µH, DCR=2mΩ



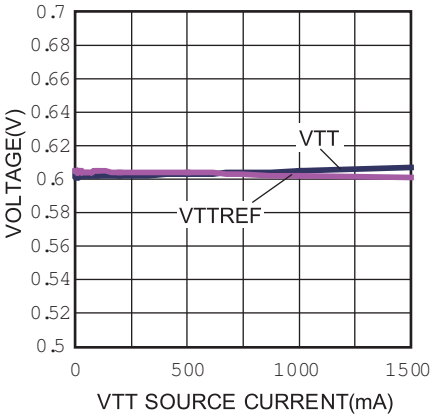
VTTLDO Sink Current Load Regulation

V_{DDQ}=1.2V, VTT=V_{DDQ}/2, I_O=5A



VTT LDO Source Current Load Regulation

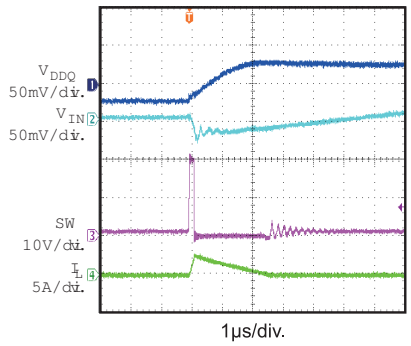
V_{DDQ}=1.2V, VTT=V_{DDQ}/2, I_O=5A



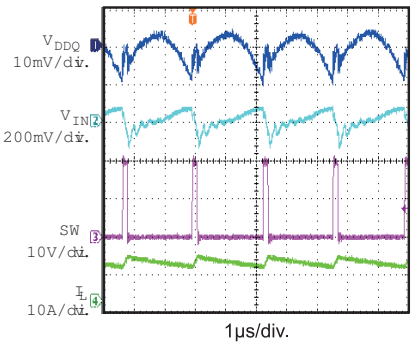
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the EVNB675L-L-00A.
V_{IN} = 20V, V_{OUT} =1.2V, L = 1.2µH, T_A = 25°C, unless otherwise noted.

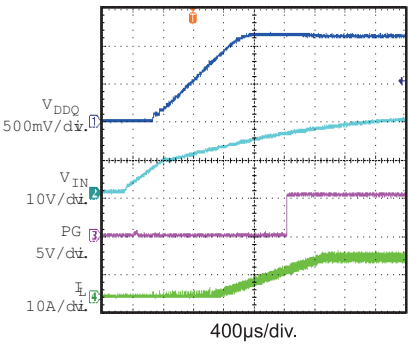
Input/ Output Voltage Ripple
I_O =0A



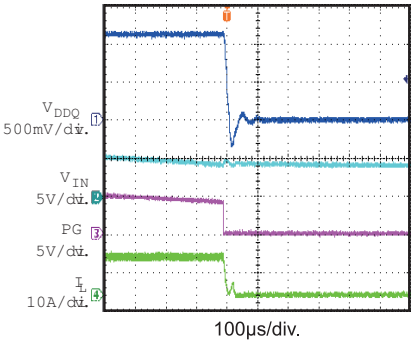
Input/ Output Voltage Ripple
I_O = 10A



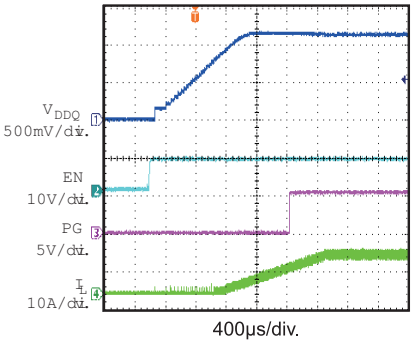
Power Good through Vin Start-up
I_O = 10A



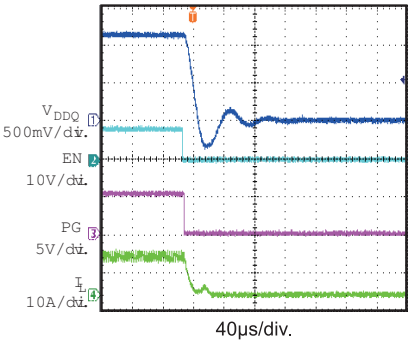
Power Good through Vin Shutdown
I_O = 10A



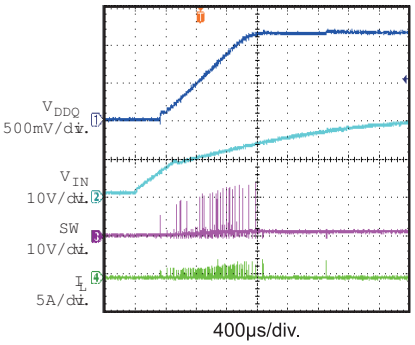
Power Good through EN Start-up
I_O = 10A



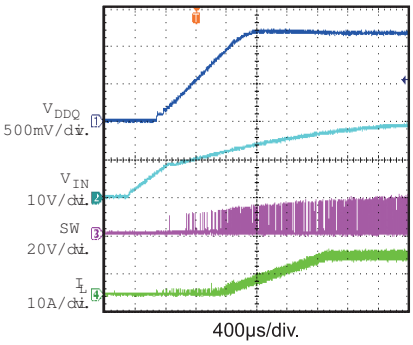
Power Good through EN Shutdown
I_O = 10A



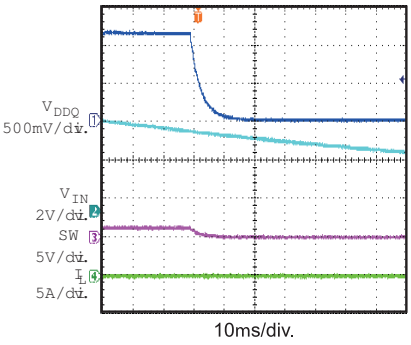
Start up through Vin
I_O = 0A



Start up through Vin
I_O = 10A



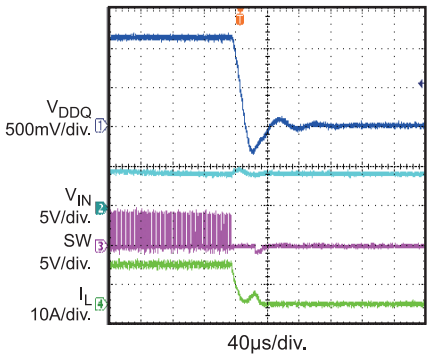
Shutdown through Vin
I_O = 0A



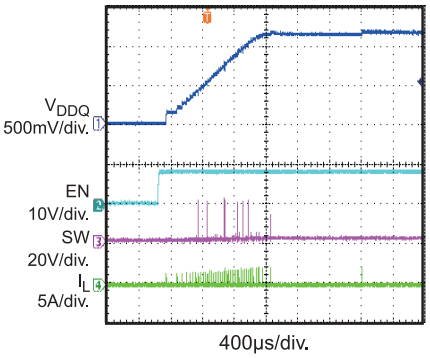
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the EVNB675L-L-00A.
V_{IN} =20V, V_{OUT} =1.2V, L = 1.2µH, T_A = 25°C, unless otherwise noted.

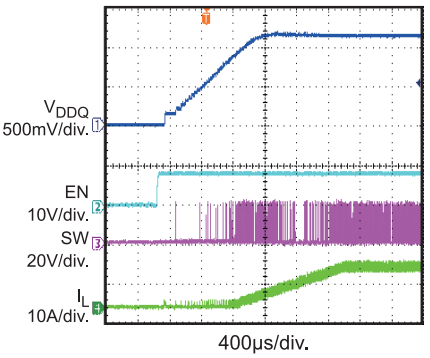
Shutdown through Vin
I_O =10A



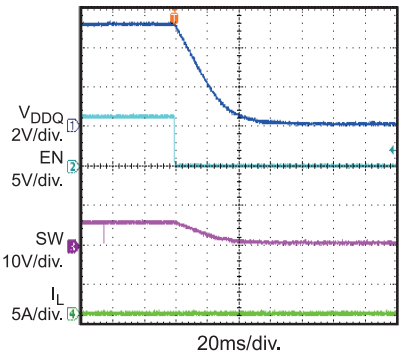
Start up through EN
I_O = 0A



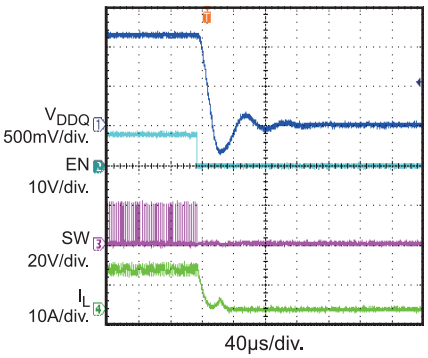
Start up through EN
I_O = 10A



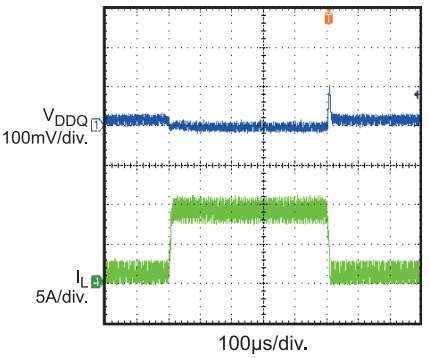
Shutdown through EN
I_O = 0A



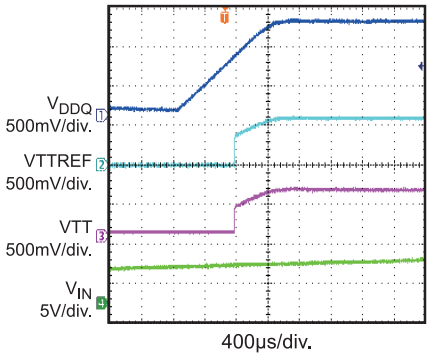
Shutdown through EN
I_O = 10A



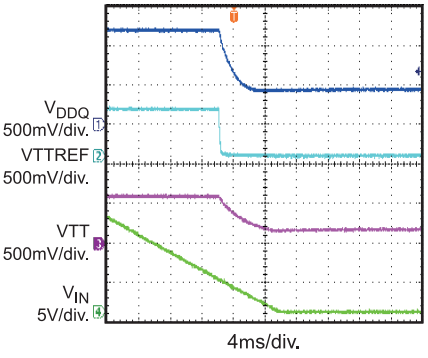
Transient
I_O = 1~9A @1A/µs, Fsw=500kHz
C_O=22µF*2+47µF



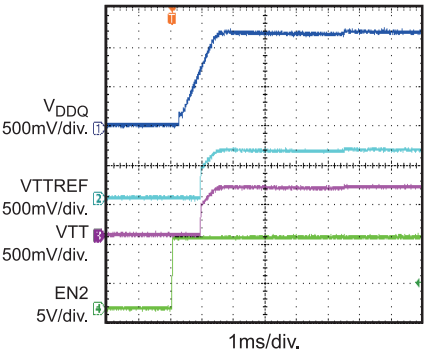
VTT&VTTREF Start-Up through Vin
I_O = 0A



VTT&VTTREF Shut-Down through Vin
I_O = 0A



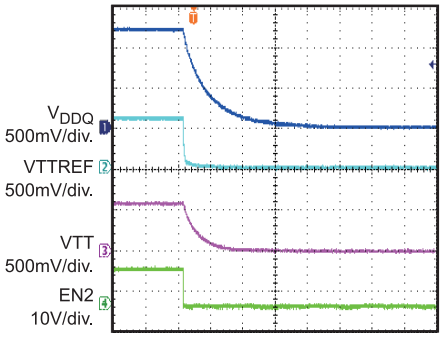
VTT&VTTREF Start-Up through EN2
I_O = 0A



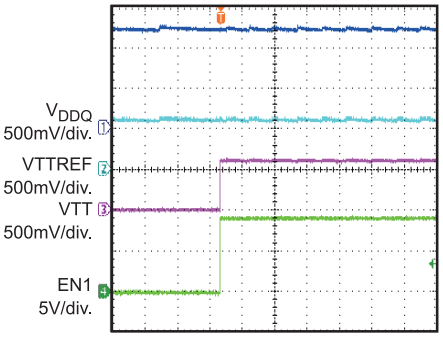
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the EVNB675L-L-00A.
V_{IN} = 20V, V_{OUT} =1.2V, L = 1.2µH, T_A = 25°C, unless otherwise noted.

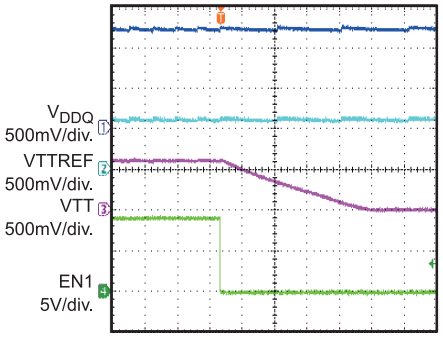
VTT&VTTREF Shut-Down through EN2
I_O = 0A



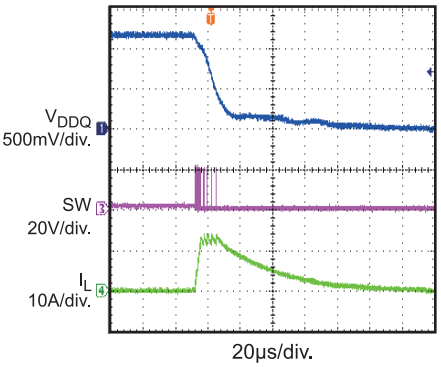
VTT Start-up through EN1
I_O = 0A



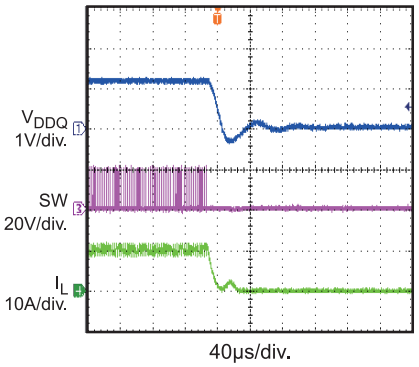
VTT Start-up through EN1
I_O = 0A



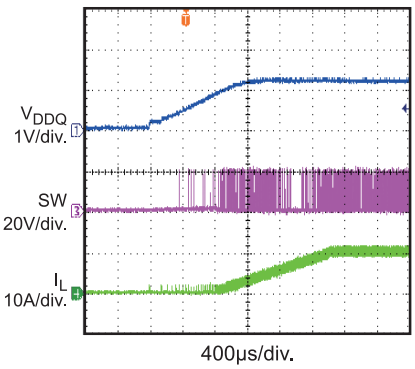
Short Circuit Protection



Thermal Shutdown
I_O = 10A



Thermal Recovery
I_O = 10A



PRINTED CIRCUIT BOARD LAYOUT

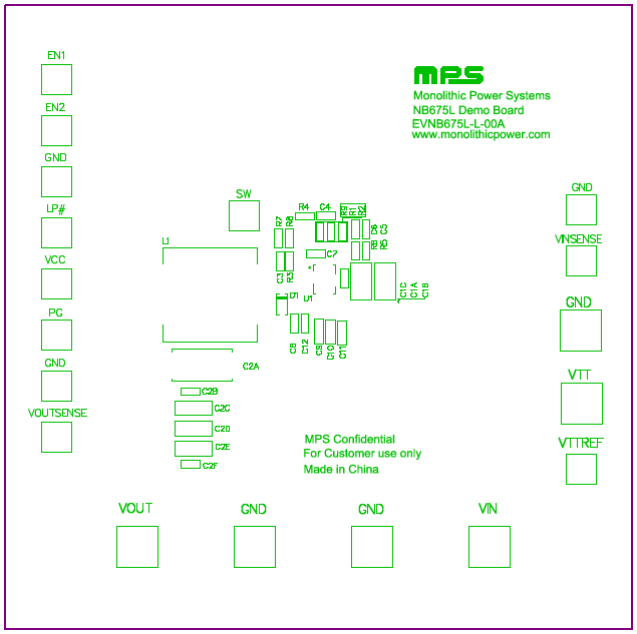


Figure 1: Top Silk Layer

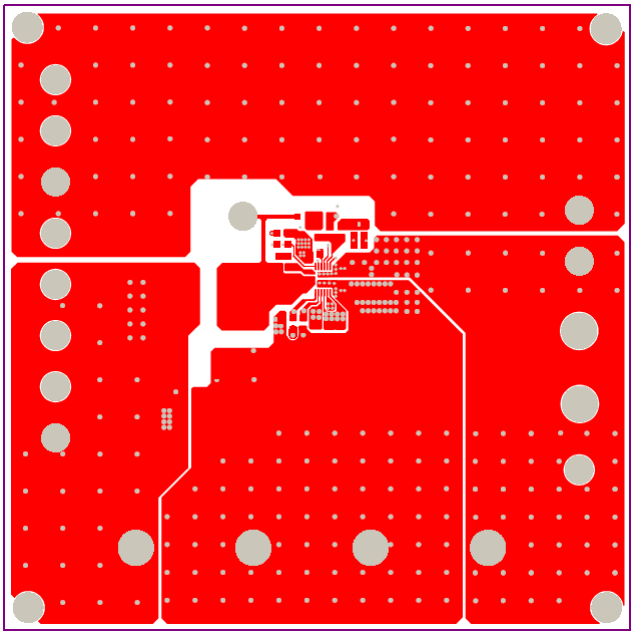


Figure 2: Top Layer

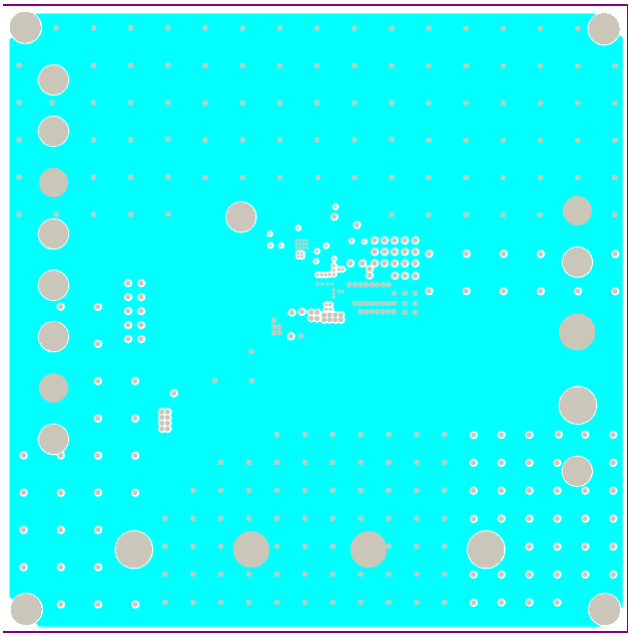


Figure 3: Inner Layer1

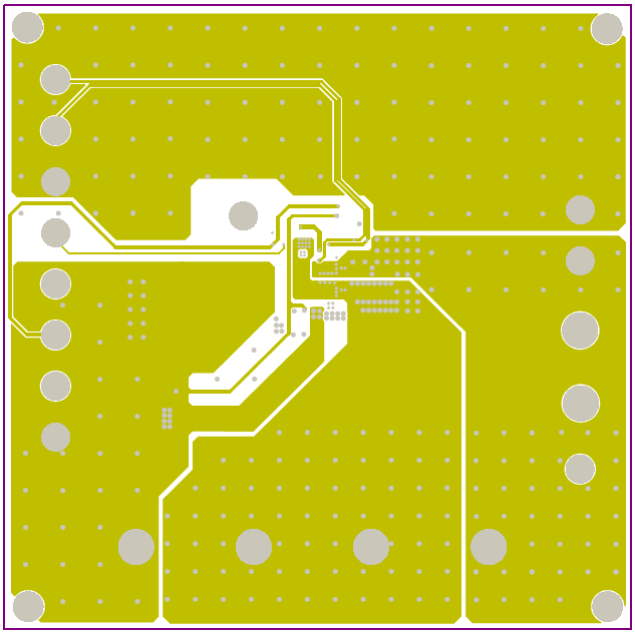


Figure 4: Inner Layer2

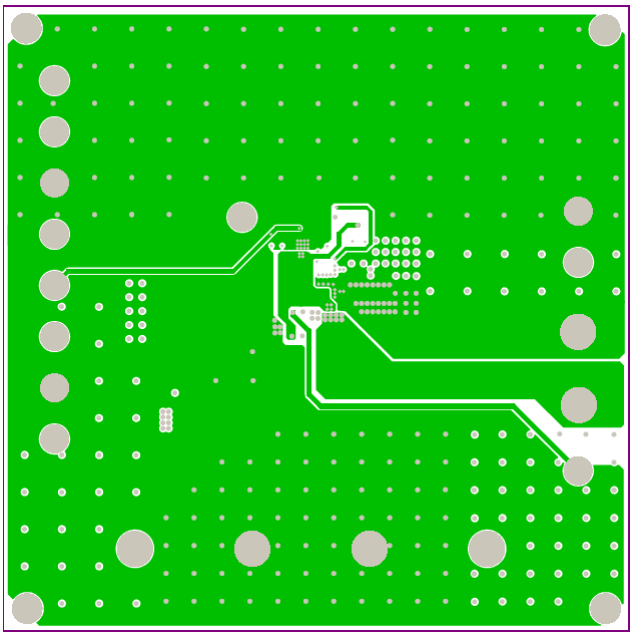


Figure 5: Bottom Layer

QUICK START GUIDE

1. Connect the positive and negative terminals of the load to the VOUT and GND pins respectively.
2. Preset the output of power supply between 4.7V and 22V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply output to the VIN and GND pins respectively:
4. Turn the power supply on. The NB675LGL will automatically start up.
5. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 2V to turn on the regulator or less than 0.4V to turn it off
6. .Use R1 and R2 to set the output voltage within VFB=0.6V. Follow the Application information section in the device datasheet to select the proper value of R1, R2, inductor and output capacitor values when output voltage is changed
7. If low ripple at light loads is needed, then use TOKO 1.5μH or 2μH L1. But with the larger L1, the transient response peak to peak value will become larger too.