# EVL6564H-25W-BB



# 25 W wide-range high power factor buck-boost converter demonstration board using the L6564H

Data brief



### Features

- Line voltage range: 85 to 265 V<sub>ac</sub>
- Minimum line frequency (fL): 47-63 Hz
- LED string voltage drop: 70 V ±10% (23 LED p.n. X42182)
- LED nominal current: 350 mA ±1%
- LED current ripple pk-pk: 100 mA
- Rated output power: 25 W
- Power factor > 0.9
- Efficiency: > 89 % at 230 V
- Maximum ambient temperature: 50 °C
- Conducted EMI: In acc. with EN55022 class-B

 Overvoltage, open loop and short-circuit protection

## Description

This demonstration board implements a widerange non-isolated 25 W regulated LED driver with high power factor. The EVL6564H-25W-BB demonstration board is well-suited to the Japanese market due to the broad use of standard 100 V<sub>ac</sub> lighting applications and also 200 V<sub>ac</sub> tubes in building automation systems.

The EVL6564H-25W-BB demonstration board has been designed in order to obtain the highest possible power factor over the entire input mains voltage, remaining compliant to EN55022 Class-B and keeping the average output current in a tight band with different LED characteristics.

The board is based on ST's L6564H power factor controller and the SEA05L CC-CV controller for LED current regulation in a non-isolated flyback configuration.

The form factor has been designed to fit into a standard LED driver case, facilitating the replacement of the incandescent flood lamps up to 80-100 W power.

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## Electrical diagram and bill of material

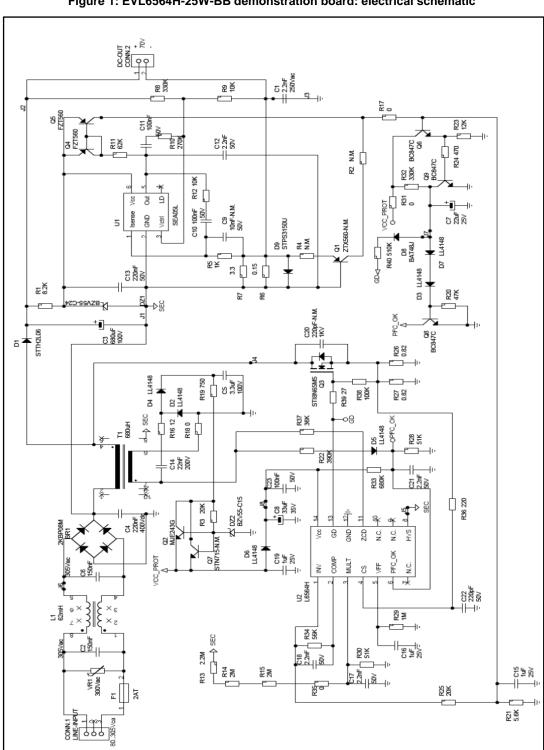


Figure 1: EVL6564H-25W-BB demonstration board: electrical schematic

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Ref.	Part N.	Туре	Supplier
BR1	2KBP08M	Bridge rect. 2 A 800 V	Vishay
Conn.1	Line-input	Connector MKDS 1.5/3-5.08-PS.5.08	Phoenix contact
Conn.2	DC-OUT	Connector MKDS 1.5/2-5.08-PS.5.08	Phoenix contact
C1	2.2 nF	Ceramic capacitor X1/Y2+-20 %-P. 7.5 mm	Murata
C2	150 nF	Capacitor MKP+-20 %-PS15-X2	Epcos
C6	150 nF	Capacitor MKP+-20 %-PS15-X2	Epcos
C3	680 µF	Electrolytic capacitor V.105 °C-PW-8000h	Nichicon
C4	220 nF	Capacitor MKP+-5 %-200 V <sub>ac</sub> -PS15	Epcos
C5	3.3 µF	Ceramic capacitor X7S 10 % EIA1210-SMD	Kemet
C7	22 µF	Electrolytic capacitor V.105 °C-2000h-PW	Nichicon
C8	33 µF	Electrolytic capacitor V.105 °C-10000h-YXM	Rubycon
C9	10 nF N.M.	Capacitor X7R 10 % EIA0805-SMD	Murata
C10	100 nF	Ceramic capacitor X7R 10 % EIA1206-SMD	Yageo
C11	100 nF	Ceramic capacitor X7R 10 % EIA0805-SMD	Kemet
C23	100 µF	Ceramic capacitor X7R 10 % EIA0805-SMD	Kemet
C12	2.2 nF	Capacitor X7R 10 % EIA0805-SMD	Kemet
C17	2.2 nF	Capacitor X7R 10 % EIA0805-SMD	Kemet
C18	2.2 nF	Capacitor X7R 10 % EIA0805-SMD	Kemet
C21	2.2 nF	Capacitor X7R 10 % EIA0805-SMD	Kemet
C13	220 nF	Ceramic capacitor Y5V -20+80 % EIA0805- SMD	AVX
C14	22 nF	Ceramic capacitor X7R 5% EIA1206-SMD	Kemet
C15	1 µF	Ceramic capacitor X7R 10 %-EIA0805-SMD	Murata
C16	1 µF	Ceramic capacitor X7R 10 %-EIA0805-SMD	Murata
C19	1 µF	Ceramic capacitor X7R 5 %-EIA0805-SMD	Kemet
C20	220 pF N.M.	Capacitor HV-U2J-5% EIA1206-SMD	Murata
C22	220 pF	Ceramic capacitor C0G 5 % EIA0805-SMD	Kemet
DZ1	BZV55-C24	Zener-diode 5 %-Sz 19.6 mV/K-SMD	NXP
DZ2	BZV55-C15	Zener-diode 5 %-Sz 11.4 mV/K-SMD	NXP
D1	STTH2L06	Ultrafast-diode 85nS	STMicroelectronics
D2	LL4148	Fast-diode 4 ns SMD	Vishay
D3	LL4148	Fast-diode 4 ns SMD	Vishay
D4	LL4148	Fast-diode 4 ns SMD	Vishay
D5	LL4148	Fast-diode 4 ns SMD	Vishay

Table 1: Bill of material

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#### EVL6564H-25W-BB

Electrical diagram and bill of material

D9   STPS3150U   Schottky-diode V <sub>1</sub> 0, 82 V @ 25 °C 3A-SMD- MKG315   STMicroelectronics     F1   2AT   Fuse 2 A 250 V 8.5 x 4-392/TE05-TIME-LAG   Littelfuse     J1   PS10mm   Wire jumper 0 Ω   -     J2   PS30mm   Wire jumper 0 Ω   -     J3   PS23mm   Wire jumper 0 Ω   -     J4   PS20mm   Wire jumper 0 Ω   -     J5   PS29mm   Wire jumper 0 Ω   -     J6   PS12mm   Wire jumper 0 Ω   -     J7   PS24mm   Wire jumper 0 Ω   -     J8   PS5mm   Wire jumper 0 Ω   -     J1   62 mH   Common mode chokes-270 V <sub>ac max</sub> Magnetica     Q1   ZTX560- N.M.   BJT.PNP-hfe 50 to 300   Diode Inc.     Q2   MJE243G   BJT.NPN-hfe 40 to 180   ON     Q3   STI8N65M5   Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11 ns-trr 200 ns   STMicroelectronics     Q4   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode Inc.   Q5     Q5   FZT560   BJT.NPN-hfe 420 t	Ref.	Part N.	Туре	Supplier
D8   BAT48J   Schottky-diode SMD-MK 48   STMicroelectronics     D9   STPS3150U   Schottky-diode V <sub>1</sub> 0, 82 V @ 25 °C 3A-SMD- MKG315   STMicroelectronics     F1   2AT   Fuse 2 A 250 V 8.5 x 4-392/TE05-TIME-LAG   Littelfuse     J1   PS10mm   Wire jumper 0 Ω   -     J2   PS30mm   Wire jumper 0 Ω   -     J4   PS20mm   Wire jumper 0 Ω   -     J5   PS29mm   Wire jumper 0 Ω   -     J6   PS12mm   Wire jumper 0 Ω   -     J7   PS24mm   Wire jumper 0 Ω   -     J8   PS5mm   Wire jumper 0 Ω   -     J7   PS24mm   Wire jumper 0 Ω   -     J8   PS5mm   Wire jumper 0 Ω   -     L1   62 mH   Common mode chokes-270 V <sub>ac max</sub> Magnetica     Q1   ZTX560-   BJT.NPN-hfe 40 to 180   ON   ON     Q3   STI8N65M5   Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11   STMicroelectronics     Q4   FZT560   BJT.PNP-SMD-hfe 50 to 300   Dio	D6	LL4148	Fast-diode 4 ns SMD	Vishay
D9 STPS3150U Schottky-diode V <sub>1</sub> 0, 82 V @ 25 °C 3A-SMD- MKG315 STMicroelectronics   F1 2AT Fuse 2 A 250 V 8.5 x 4-392/TE05-TIME-LAG Littelfuse   J1 PS10mm Wire jumper 0 Ω -   J2 PS30mm Wire jumper 0 Ω -   J3 PS23mm Wire jumper 0 Ω -   J4 PS20mm Wire jumper 0 Ω -   J6 PS12mm Wire jumper 0 Ω -   J7 PS24mm Wire jumper 0 Ω -   J8 PS5mm Wire jumper 0 Ω -   J8 PS5mm Wire jumper 0 Ω -   J1 EXt560- BJT.PNP-hfe 50 to 300 Diode Inc.   Q1 ZTX560- BJT.PNP-hfe 40 to 180 ON   Q2 MJE243G BJT.NPN-hfe 40 to 300 Diode Inc.   Q3 STI8N65M5 Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11 STMicroelectronics   Q4 FZT560 BJT.PNP-SMD-hfe 50 to 300 Diode Inc. Q   Q5 FZT560 BJT.NPN-hfe 420 to 800-SMD-MK1G NXP   Q8 BC847C BJT.NPN-hfe 420 to 800-SMD-MK1G	D7	LL4148	Fast-diode 4 ns SMD	Vishay
MKG315   F1   2AT   Fuse 2 A 250 V 8.5 x 4-392/TE05-TIME-LAG   Littelfuse     J1   PS10mm   Wire jumper 0 Ω   -   -     J2   PS30mm   Wire jumper 0 Ω   -   -     J3   PS23mm   Wire jumper 0 Ω   -   -     J4   PS20mm   Wire jumper 0 Ω   -   -     J5   PS29mm   Wire jumper 0 Ω   -   -     J6   PS12mm   Wire jumper 0 Ω   -   -     J7   PS24mm   Wire jumper 0 Ω   -   -     J8   PS5mm   Wire jumper 0 Ω   -   -     J8   PS5mm   Wire jumper 0 Ω   -   -     J1   62 mH   Common mode chokes-270 V <sub>ac max</sub> Magnetica     Q1   ZTX560-   BJT.PNP-hfe 50 to 300   Diode Inc.     Q2   MJE243G   BJT.NPN-hfe 40 to 180   ON     Q3   STI8N65M5   Power MOSFET-N-channel, 0.6 Ω-tr/tt 14/11   STMicroelectronics     Q4   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode I	D8	BAT48J	Schottky-diode SMD-MK 48	STMicroelectronics
J1   PS10m   Wire jumper 0 Ω   ·     J2   PS30mm   Wire jumper 0 Ω   ·     J3   PS23mm   Wire jumper 0 Ω   ·     J4   PS20mm   Wire jumper 0 Ω   ·     J5   PS29mm   Wire jumper 0 Ω   ·     J6   PS12mm   Wire jumper 0 Ω   ·     J7   PS24mm   Wire jumper 0 Ω   ·     J8   PS5mm   Wire jumper 0 Ω   ·     J8   PS5mm   Wire jumper 0 Ω   ·     J8   PS5mm   Wire jumper 0 Ω   ·     J1   62 mH   Common mode chokes-270 Vac max   Magnetica     Q1   ZTX560- N.M.   BJT.PNP-hfe 50 to 300   Diode Inc.     Q2   MJE243G   BJT.NPN-hfe 40 to 180   ON     Q3   STIBN65M5   Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11   STMicroelectronics     Q4   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode Inc.     Q5   FZT560   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q8   BC847C   BJT.NPN-	D9	STPS3150U		STMicroelectronics
J2   PS30mm   Wire jumper 0 Ω   -     J3   PS23mm   Wire jumper 0 Ω   -     J4   PS20mm   Wire jumper 0 Ω   -     J5   PS29mm   Wire jumper 0 Ω   -     J6   PS12mm   Wire jumper 0 Ω   -     J7   PS24mm   Wire jumper 0 Ω   -     J8   PS5mm   Wire jumper 0 Ω   -     J8   PS5mm   Wire jumper 0 Ω   -     J8   PS5mm   Wire jumper 0 Ω   -     L1   62 mH   Common mode chokes-270 V <sub>ac max</sub> Magnetica     Q1   ZTX560- N.M.   BJT.PNP-hfe 50 to 300   Diode Inc.     Q2   MJE243G   BJT.NPN-hfe 40 to 180   ON     Q3   STI8N65M5   Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11   STMicroelectronics     Q4   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode Inc.     Q5   FZT560   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q8   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q9   BC847C	F1	2AT	Fuse 2 A 250 V 8.5 x 4-392/TE05-TIME-LAG	Littelfuse
J3 PS23mm Wire jumper 0 Ω -   J4 PS20mm Wire jumper 0 Ω -   J5 PS29mm Wire jumper 0 Ω -   J6 PS12mm Wire jumper 0 Ω -   J7 PS24mm Wire jumper 0 Ω -   J8 PS5mm Wire jumper 0 Ω -   J8 PS5mm Wire jumper 0 Ω -   L1 62 mH Common mode chokes-270 Vac max Magnetica   Q1 ZTX560- N.M. BJT.PNP-hfe 50 to 300 Diode Inc.   Q2 MJE243G BJT.PNP-hfe 40 to 180 ON   Q3 STI8N65M5 Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11 STMicroelectronics   Q4 FZT560 BJT.PNP-SMD-hfe 50 to 300 Diode Inc.   Q5 FZT560 BJT.NPN-SMD-hfe 50 to 300 Diode Inc.   Q6 BC847C BJT.NPN-hfe 420 to 800-SMD-MK1G NXP   Q8 BC847C BJT.NPN-hfe 420 to 800-SMD-MK1G NXP   Q9 BC847C BJT.NPN-hfe 420 to 800-SMD-MK1G NXP   Q7 STN715- N.M. BJT.NPN-SMD-hfe80-MK N715 STMicroelectronics	J1	PS10mm	Wire jumper 0 Ω	-
J4   PS20mm   Wire jumper 0 Ω   -     J5   PS29mm   Wire jumper 0 Ω   -     J6   PS12mm   Wire jumper 0 Ω   -     J7   PS24mm   Wire jumper 0 Ω   -     J8   PS5mm   Wire jumper 0 Ω   -     J8   PS5mm   Wire jumper 0 Ω   -     L1   62 mH   Common mode chokes-270 V <sub>ac max</sub> Magnetica     Q1   ZTX560- N.M.   BJT.PNP-hfe 50 to 300   Diode Inc.     Q2   MJE243G   BJT.NPN-hfe 40 to 180   ON     Q3   STI8N65M5   Power MOSFET-N-channel, 0.6 Ω-tr/ff 14/11   STMicroelectronics     ns-trr 200 ns   Power MOSFET-N-channel, 0.6 Ω-tr/ff 14/11   STMicroelectronics     Q4   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode Inc.     Q5   FZT560   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q8   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q9   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q7   STN715-   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP	J2	PS30mm	Wire jumper 0 Ω	-
J5PS29mmWire jumper 0 Ω-J6PS12mmWire jumper 0 Ω-J7PS24mmWire jumper 0 Ω-J8PS5mmWire jumper 0 Ω-L162 mHCommon mode chokes-270 V <sub>ac max</sub> MagneticaQ1ZTX560- N.M.BJT.PNP-hfe 50 to 300Diode Inc.Q2MJE243GBJT.PNP-hfe 40 to 180ONQ3STI8N65M5Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11 ns-trr 200 nsSTMicroelectronicsQ4FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q5FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q6BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ9BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ7STN715- N.M.BJT.NPN-sMD-hfe80-MK N715STMicroelectronicsR18.2 KResistor 1 %TE-LR1F8K2R320 KResistor 1 %TE-LR1F8K2R4N.M.Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMDVishayR60.15Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMDIRC-LRC	J3	PS23mm	Wire jumper 0 Ω	-
J6   PS12mm   Wire jumper 0 Ω   -     J7   PS24mm   Wire jumper 0 Ω   -     J8   PS5mm   Wire jumper 0 Ω   -     L1   62 mH   Common mode chokes-270 V <sub>ac max</sub> Magnetica     Q1   ZTX560- N.M.   BJT.PNP-hfe 50 to 300   Diode Inc.     Q2   MJE243G   BJT.NPN-hfe 40 to 180   ON     Q3   STI8N65M5   Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11   STMicroelectronics     Q4   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode Inc.     Q5   FZT560   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q6   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q9   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q7   STN715- N.M.   BJT.NPN-sMD-hfe80-MK N715   STMicroelectronics     R1   8.2 K   Resistor 1 %   TE-LR1F8K2     R2   N.M.   Resistor 1 %   TE-LR1F8K2     R3   20 K   Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R5   1 K   Resistor 1	J4	PS20mm	Wire jumper 0 Ω	-
J7PS24mmWire jumper 0 Ω-J8PS5mmWire jumper 0 Ω-L162 mHCommon mode chokes-270 Vac maxMagneticaQ1ZTX560- N.M.BJT.PNP-hfe 50 to 300Diode Inc.Q2MJE243GBJT.NPN-hfe 40 to 180ONQ3STI8N65M5Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11 ns-trr 200 nsSTMicroelectronicsQ4FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q5FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q6BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ8BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ9BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ7STN715- N.M.BJT.NPN-SMD-hfe80-MK N715STMicroelectronicsR18.2 KResistor 1 %TE-LR1F8K2R320 KResistor 1 %TE-LR1F8K2R4N.M.Resistor 1 % -150 Vac/dc - EIA0805-SMDVishayR51 KResistor 1 % -150 Vac/dc - EIA0805-SMDVishayR60.15Resistor 1 % -200 Vac/dc - EIA1206-SMDIRC-LRC	J5	PS29mm	Wire jumper 0 Ω	-
J8PS5mmWire jumper 0 Ω-L162 mHCommon mode chokes-270 Vac maxMagneticaQ1ZTX560- N.M.BJT.PNP-hfe 50 to 300Diode Inc.Q2MJE243GBJT.NPN-hfe 40 to 180ONQ3STI8N65M5Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11 ns-trr 200 nsSTMicroelectronicsQ4FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q5FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q6BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ8BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ9BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ7STN715- N.M.BJT.NPN-sMD-hfe80-MK N715STMicroelectronicsR18.2 KResistor 1 %TE-LR1F8K2R320 KResistor 1 %TE-LR1F8K2R4N.M.Resistor 1 % -150 Vac/dc - EIA0805-SMDVishayR51 KResistor 1 % -150 Vac/dc - EIA0805-SMDVishayR60.15Resistor 1 % -200 Vac/dc - EIA1206-SMDIRC-LRC	J6	PS12mm	Wire jumper 0 Ω	-
L162 mHCommon mode chokes-270 Vac maxMagneticaQ1ZTX560- N.M.BJT.PNP-hfe 50 to 300Diode Inc.Q2MJE243GBJT.NPN-hfe 40 to 180ONQ3STI8N65M5Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11 ns-trr 200 nsSTMicroelectronicsQ4FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q5FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q6BC847CBJT.NPN-SMD-hfe 50 to 300Diode Inc.Q8BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ9BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ7STN715- N.M.BJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ7STN715- 	J7	PS24mm	Wire jumper 0 Ω	-
Q1ZTX560- N.M.BJT.PNP-hfe 50 to 300Diode Inc.Q2MJE243GBJT.NPN-hfe 40 to 180ONQ3STI8N65M5Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11 ns-trr 200 nsSTMicroelectronicsQ4FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q5FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q6BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ8BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ7STN715- N.M.BJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ7STN715- N.M.BJT.NPN-hfe 420 to 800-SMD-MK1GNXPR18.2 KResistor 1 %TE-LR1F8K2R2N.M.Resistor 1 %TE-LR1F8K2R320 KResistor 1 % -150V <sub>ac/dc</sub> - EIA0805-SMDVishayR51 KResistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMDVishayR60.15Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMDIRC-LRC	J8	PS5mm	Wire jumper 0 Ω	-
N.M.Definition for bottomQ2MJE243GBJT.NPN-hfe 40 to 180ONQ3STI8N65M5Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11 ns-trr 200 nsSTMicroelectronicsQ4FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q5FZT560BJT.PNP-SMD-hfe 50 to 300Diode Inc.Q6BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ8BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ9BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ7STN715- N.M.BJT.NPN-hfe 420 to 800-SMD-MK1GSTMicroelectronicsR18.2 KResistor 1 %TE-LR1F8K2R2N.M.Resistor 1 %TE-LR1F8K2R320 KResistor 1 %TE-LR1F20KR4N.M.Resistor 1 % -150Vac/dc - EIA0805-SMDVishayR51 KResistor 1 % -200 Vac/dc - EIA1206-SMDVishayR60.15Resistor 1 % -200 Vac/dc - EIA1206-SMDIRC-LRC	L1	62 mH	Common mode chokes-270 V <sub>ac max</sub>	Magnetica
Q3   STI8N65M5   Power MOSFET-N-channel, 0.6 Ω-tr/tf 14/11 ns-trr 200 ns   STMicroelectronics     Q4   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode Inc.     Q5   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode Inc.     Q6   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q8   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q9   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q7   STN715- N.M.   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q7   STN715- N.M.   BJT.NPN-SMD-hfe80-MK N715   STMicroelectronics     R1   8.2 K   Resistor 1 %   TE-LR1F8K2     R2   N.M.   Resistor 1 %   TE-LR1F8K2     R3   20 K   Resistor 1 %   TE-LR1F20K     R4   N.M.   Resistor 1 % -150V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R5   1 K   Resistor 1 % -200 V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R6   0.15   Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD   IRC-LRC	Q1		BJT.PNP-hfe 50 to 300	Diode Inc.
Q4   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode Inc.     Q5   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode Inc.     Q6   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q8   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q9   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q7   STN715- N.M.   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q7   STN715- N.M.   BJT.NPN-SMD-hfe80-MK N715   STMicroelectronics     R1   8.2 K   Resistor 1 %   TE-LR1F8K2     R2   N.M.   Resistor 1 %   TE-LR1F8K2     R3   20 K   Resistor 1 % -150V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R5   1 K   Resistor 1 % -150V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R6   0.15   Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD   IRC-LRC	Q2	MJE243G	BJT.NPN-hfe 40 to 180	ON
Q5   FZT560   BJT.PNP-SMD-hfe 50 to 300   Diode Inc.     Q6   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q8   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q9   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q9   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q7   STN715- N.M.   BJT.NPN-SMD-hfe80-MK N715   STMicroelectronics     R1   8.2 K   Resistor 1 %   TE-LR1F8K2     R2   N.M.   Resistor 1 %   TE-LR1F8K2     R3   20 K   Resistor 1 %   TE-LR1F20K     R4   N.M.   Resistor 1 % -150 Vac/dc - EIA0805-SMD   Vishay     R5   1 K   Resistor 1 % -150 Vac/dc - EIA0805-SMD   Vishay     R6   0.15   Resistor 1 % -200 Vac/dc - EIA1206-SMD   IRC-LRC	Q3	STI8N65M5		STMicroelectronics
Q6   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q8   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q9   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q9   BC847C   BJT.NPN-hfe 420 to 800-SMD-MK1G   NXP     Q7   STN715- N.M.   BJT.NPN-SMD-hfe80-MK N715   STMicroelectronics     R1   8.2 K   Resistor 1 %   TE-LR1F8K2     R2   N.M.   Resistor 1 %   TE-LR1F8K2     R3   20 K   Resistor 1 %   TE-LR1F8K2     R4   N.M.   Resistor 1 % -150V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R5   1 K   Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R6   0.15   Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD   IRC-LRC	Q4	FZT560	BJT.PNP-SMD-hfe 50 to 300	Diode Inc.
Q8BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ9BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ7STN715- N.M.BJT.NPN-SMD-hfe80-MK N715STMicroelectronicsR18.2 KResistor 1 %TE-LR1F8K2R2N.M.Resistor 1 %TE-LR1F8K2R320 KResistor 1 %TE-LR1F20KR4N.M.Resistor 1 % -150Vac/dc - EIA0805-SMDVishayR51 KResistor 1 % -200 Vac/dc - EIA1206-SMDIRC-LRCR60.15Resistor 1 % -200 Vac/dc - EIA1206-SMDIRC-LRC	Q5	FZT560	BJT.PNP-SMD-hfe 50 to 300	Diode Inc.
Q9BC847CBJT.NPN-hfe 420 to 800-SMD-MK1GNXPQ7STN715- N.M.BJT.NPN-SMD-hfe80-MK N715STMicroelectronicsR18.2 KResistor 1 %TE-LR1F8K2R2N.M.Resistor 1 %TE-LR1F8K2R320 KResistor 1 %TE-LR1F8K2R4N.M.Resistor 1 % -150Vac/dc - EIA0805-SMDVishayR51 KResistor 1 % -150 Vac/dc - EIA0805-SMDVishayR60.15Resistor 1 % -200 Vac/dc - EIA1206-SMDIRC-LRC	Q6	BC847C	BJT.NPN-hfe 420 to 800-SMD-MK1G	NXP
Q7STN715- N.M.BJT.NPN-SMD-hfe80-MK N715STMicroelectronicsR18.2 KResistor 1 %TE-LR1F8K2R2N.M.Resistor 1 %TE-LR1F8K2R320 KResistor 1 %TE-LR1F8K2R4N.M.Resistor 1% -150Vac/dc - EIA0805-SMDVishayR51 KResistor 1 % -150 Vac/dc - EIA0805-SMDVishayR60.15Resistor 1 % -200 Vac/dc - EIA1206-SMDIRC-LRC	Q8	BC847C	BJT.NPN-hfe 420 to 800-SMD-MK1G	NXP
N.M.   Definition of the mode micro of the mod	Q9	BC847C	BJT.NPN-hfe 420 to 800-SMD-MK1G	NXP
R2   N.M.   Resistor 1 %   TE-LR1F8K2     R3   20 K   Resistor 1 %   TE-LR1F20K     R4   N.M.   Resistor 1% -150V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R5   1 K   Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R6   0.15   Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD   IRC-LRC	Q7		BJT.NPN-SMD-hfe80-MK N715	STMicroelectronics
R3   20 K   Resistor 1 %   TE-LR1F20K     R4   N.M.   Resistor 1% -150V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R5   1 K   Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R6   0.15   Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD   IRC-LRC	R1	8.2 K	Resistor 1 %	TE-LR1F8K2
R4   N.M.   Resistor 1% -150V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R5   1 K   Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R6   0.15   Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD   IRC-LRC	R2	N.M.	Resistor 1 %	TE-LR1F8K2
R5   1 K   Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD   Vishay     R6   0.15   Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD   IRC-LRC	R3	20 K	Resistor 1 %	TE-LR1F20K
R6   0.15   Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD   IRC-LRC	R4	N.M.	Resistor 1% -150V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
	R5	1 K	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R7 3.3 Resistor 1 % -200 Vac/dc - EIA1206-SMD Vishay	R6	0.15	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	IRC-LRC
	R7	3.3	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R8   330 K   Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD   Vishay	R8	330 K	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R9   10 K   Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD   Vishay	R9	10 K	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay



#### Electrical diagram and bill of material

#### EVL6564H-25W-BB

Ref.	Part N.	Туре	Supplier
R10	270 K	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R11	62 K	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R12	10 K	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R13	2.2M	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R14	2M	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R15	2M	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R16	12	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R17	0	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R18	0	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R31	0	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R19	750	Resistor 1 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R20	47 K	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
C//R20 <sup>(1)</sup>	10 nF	Ceramic capacitor X7R 10% EIA0805-SMD	Kemet
R21	5.6 K	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R22	390 K	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R23	12 K	Resistor 1 % -150 Vac/dc - EIA0805-SMD	Vishay
R24	470	Resistor 1 % -150 Vac/dc - EIA0805-SMD	Vishay
R25	20 K	Resistor 1 % -150 Vac/dc - EIA0805-SMD	Vishay
R26	0.82	Resistor 1 % EIA1210-SMD	Rohm
R27	0.82	Resistor 1 % EIA1210-SMD	Rohm
R28	51 K	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R29	1M	Resistor 1 % -50 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R30	51 K	Resistor 5 % -50 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R32	330 K	Resistor 1 % -150 Vac/dc - EIA0805-SMD	Vishay
R33	680 K	Resistor 5 % -200 Vac/dc - EIA1206-SMD	Vishay
R34	56 K	Resistor 5 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R35	0	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R36	220	Resistor 5 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R37	36 K	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R38	100 K	Resistor 5 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
R39	27	Resistor 5 % -200 V <sub>ac/dc</sub> - EIA1206-SMD	Vishay
R40	510 K	Resistor 1 % -150 V <sub>ac/dc</sub> - EIA0805-SMD	Vishay
T1	680 µH	Lighting buck/boost indut. 40 KHz	Magnetica
U1	SEA05L	I.CCC/CV CTR3,536 V-V <sub>ac</sub> 0.5 %-I <sub>acc</sub> 4 %- MK S5L-SMD	STMicroelectronics

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#### EVL6564H-25W-BB

#### Electrical diagram and bill of material

Ref.	Part N.	Туре	Supplier
U2	L6564H	I.CPFC-CTRHVS-TM-SMD	STMicroelectronics
VR1	300 V <sub>ac</sub>	VDR-300 V <sub>ac</sub> - 385 V <sub>dc</sub> - 47J-D12mm	Epcos

#### Notes:

<sup>(1)</sup>Add a 10 nF capacitor in parallel to R20 (0805).



# 2 Power factor vs. line with LED load

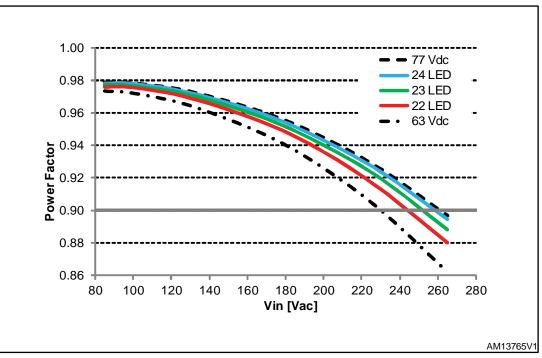
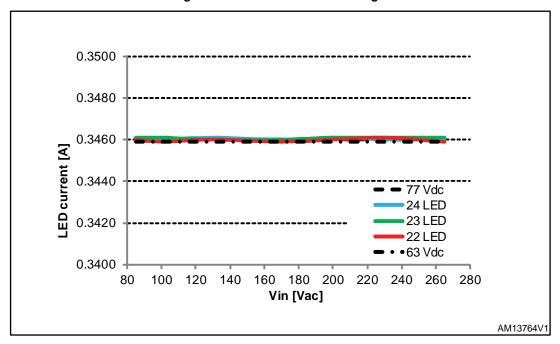
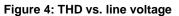


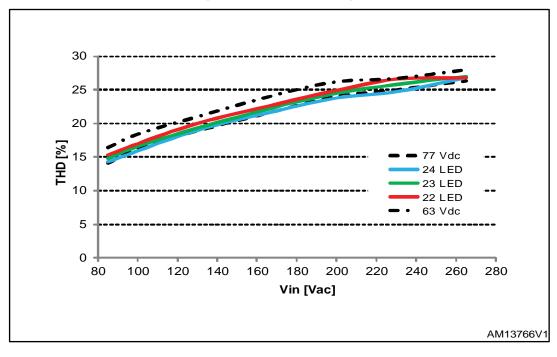
Figure 2: Power factor vs. line voltage

Figure 3: LED current vs. line voltage



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## 3 References

- 1. AN1059 Design equation of high-power-factor flyback converters based on the L6561
- 2. AN1060 Flyback converters with the L6561 PFC controller
- 3. L6564H Datasheet
- 4. SEA05L Datasheet
- 5. STI8N65M5 Datasheet





# 4 Revision history

#### Table 2: Document revision history

Date	Revision	Changes
15-Jul-2013	1	Initial release.
18-Jul-2013	2	Updated description in cover page and the Table 1: "Bill of material" .



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