

LAYOUT NOTE:
Keep feedback loop as small as possible.

LAYOUT NOTE:
Place this bypass capacitor near pin 6.

DESIGN NOTE:
Inductor Recommended Specs:
Current Rating > I_{Limit}
Saturation Current > I_{sc}

I_{Limit} = 4.1A (Max.)
I_{sc} = 5.05A (Max.)

DESIGN NOTE:
Output Voltage Equation:
 $RFB2 = RFB1 / ((V_{out}/V_{ref}) - 1)$

V_{ref} = 0.985V (Min.)
RFB2 = 100k (Recommended)

 $RFB1 = 100k / ((3.3V - 0.985V) - 1)$
RFB1 = 43.2k

DESIGN NOTE:
Inductor Sizing Equation:
 $L = ((V_{in} - V_{out}) / (f_{sw} * K * I_{max})) * (V_{out}/V_{in})$

f_{sw} = 2100kHz
K = 30% (of Current Ripple)
I_{max} = 3A

 $L = ((12V - 3.3V) / (2.1mHz * 0.3 * 3)) * (3.3V/12V)$
L = 1.2uH

12V to 3.3V @ 3A Buck Regulator

Power Rail

+3V3 TP1

Internal VCC

INT_VCC TP2

Switching Voltage

SW TP3

Feedback Voltage

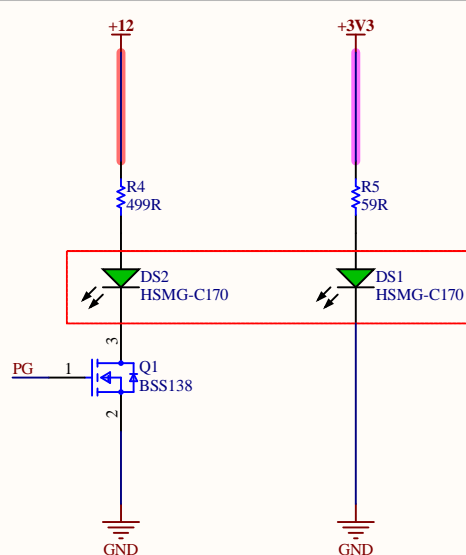
FB TP4

Ground

GND TP5

GND TP6

Test Points



PGOOD Indicator

VOUT Indicator

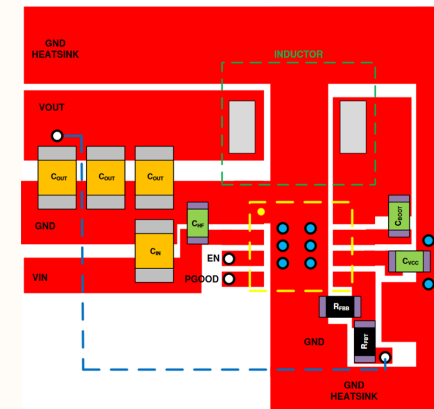
DESIGN NOTE:
HSMG-C170 LEDs have a luminous intensity around 15mcd (Typ.) at forward current.

DESIGN NOTE:
HSMG-C170 current limiting resistor calculations:

V_f = 2.2V (Typ.)
I_f = 20mA
[PGOOD_LED]
 $R = (12V - 2.2V) / 20mA$
R = 490R

[VOUT_LED]
 $R = (3.3V - 2.2V) / 20mA$
R = 55R

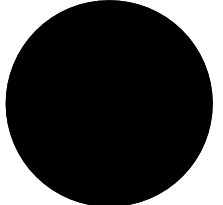
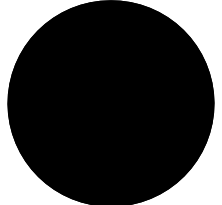
10.2 Layout Example



Additional Notes

Title		
WORK IN PROGRESS		
Size	Number	Revision
A4		
Date:	3/03/2024	Sheet of
File:	C:\Users\... \IEEE Buck Converter F23.Sch	Drawn By: Mari Takizala





SW



VOUT



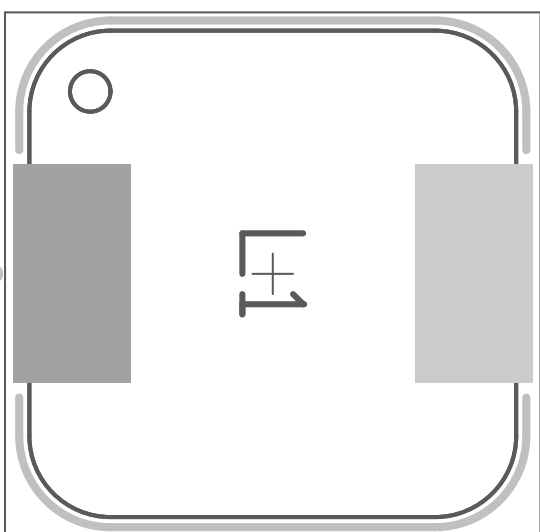
GND



VOUT GOOD



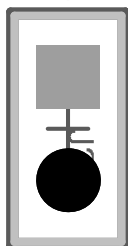
L1



R5

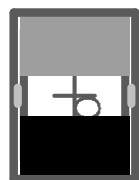
VIN

+



-

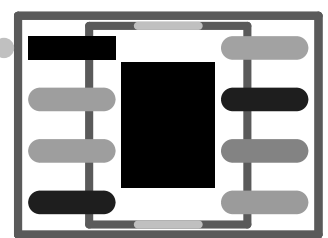
C6



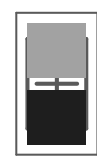
C7



U1



C1



C8

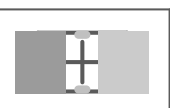
R2



R4



R3



R1

C2



C3



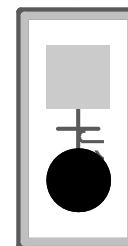
C4



C5



+



-

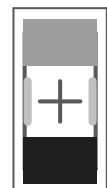
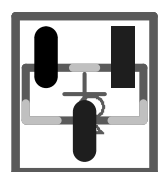
VOUT



DC-DC BUCK CONVERTER

12V IN | 3.3V OUT 3A

Q1



VIN GOOD



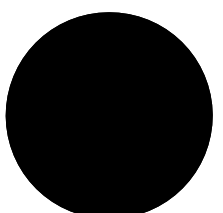
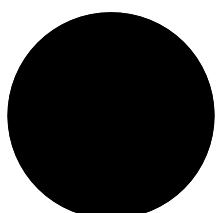
FB



INT VCC



GND



Comment	Description	Designator	Footprint	LibRef	Quantity
0.1uF	08055C104KAZ2A	C1	CAPC2013X94X50NL2 0T25	CMP-2007-04372-1	1
22uF	CAP CER 22UF 25V X5R 1210 TMK325BJ226MM-T	C2, C3, C4, C5	FP-MK325M-MFG	CMP-14477-000145-1	4
10uF	Cap Ceramic 10uF 50V X7R ±10% SMD 1210 +125°C Embossed T/R CL32B106KBJNNNE	C6	FP-CL32-IPC_C	CMP-2000-06110-2	1
220nF	CAP CER 0.22UF 50V X7R 0805 CC0805KKX7R9BB224	C7	FP-CC0805-0_85-MFG	CMP-03422-000996-1	1
1uF	CC0805ZRY5V8BB105	C8	CAPC2013X145X50ML 20T25	CMP-1036-04757-2	1
HSMG-C170	Chip LED, Green, 2.2 V, -40 to 85 degC, 2- Pin SMD, Pb-Free, Tape and Reel	DS1, DS2	AVAG-HSMX-C170_V	CMP-2000-05062-1	2
M20-9990246	CONN HEADER VERT 2POS 2.54MM	J1, J2	FP-M20-9990246- MFG	CMP-15831-000009-1	2
1.2uH		L1	WE-PD_1280	CMP-0227-00164-2	1
BSS138	MOSFET N-CH 50V 220MA SOT-23	Q1	FP-318-08-IPC_B	CMP-07173-000101-1	1
100k		R1, R2	RESC2013X50X30ML2 0T20	CMP-2001-04900-1	2
43.2k		R3	RESC2013X60X35NL1 0T20	CMP-2001-01147-1	1
499R	499R 0.25W 1% 1206 (3216 Metric) SMD	R4	RESC1206(3216)_N	CMP-1014-00476-1	1
59R		R5	RESC2013X60X35LL10 T20	CMP-1013-00371-2	1
5019	Test Point, 1 Position SMD, RoHS, Tape and Reel 5019	TP1, TP2, TP3, TP4, TP5, TP6	KSTN-5019_V	CMP-1672-00008-1	6
LMR33630CDDAR	IC REG BUCK ADJUSTABLE 3A 8SOPWR	U1	FP-DDA0008J-IPC_B	CMP-04918-000348-1	1