400W-750W, 9 to 18V, 18 to 32V or 18 to 60V Input Non-Isolated Ruggedized Step-Down DC-DC Buck Converter

https://product.tdk.com/en/power/rgb
www.emea.lambda.tdk.com/rgb

Industrial COTS Test COMM Broadcast Robotics

The rugged RGB non-isolated DC-DC step-down converters are encapsulated in a five-sided aluminum case that's rated for up to 115˚C operation. These modules have the industry standard 1/16th brick pin-out, are qualified to MIL-STD-810G for shock and vibration, and are designed for fan-less, conduction-cooled applications. The series accepts a wide input range to accommodate various DC bus and battery voltages. The RGB modules come with standard features like remote On/Off, remote sense, output trim, and optional adjustable output current limit, making the modules a truly versatile power solution. The wide output adjustment range allows one model to be used in multiple DC output voltage positions, assisting inventory and part number reduction.

Features	Benefits
• Up to 750W in a 1/16th Brick-Pin-Out	• High Power Density, Less Board Area Needed
• Encapsulated in a 5-sided metal case	• Improves EMI
• 115°C Maximum Case Temperature	• Rugged deployment in harsh environment with high shock & vibration exposure
• Efficiency - Up to 98.5%	• Longer Battery Life / Low Power Consumed
• Wide Output Adjustment from 0.8 up to 24V	• One Part Supports Multiple System Voltages
• Wide Input Range	• Can Operate from Different DC Input Source Voltages
• Adjustable Current Limit	• Reduces stress on the input source, converter and load due to overloading

Model Selector

Model	Input Voltage (V)	Output Voltage (V)	Max Current (A)	Max Power (W)	Negative Logic On/Off	Full Feature
RGB4W500W033A-001	18 - 60	3.3 - 24	33	500	Yes	-
RGB4W500W033A-003	18 - 60	3.3 - 24	33	500	Yes	Yes
RGB24750W045A-001	18 - 32	3.3 - 18	45	750	Yes	-
RGB24750W045A-003	18 - 32	3.3 - 18	45	750	Yes	Yes
RGB12400W060A-001	9 - 18	0.8 - 8	60	400	Yes	-
RGB12400W060A-003	9 - 18	0.8 - 8	60	400	Yes	Yes

Related Products

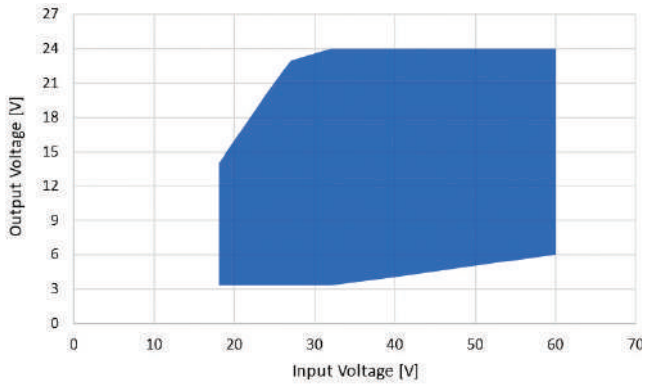
Type	Part Number	Description
Ruggedized DC-DC Buck Converter	RGA	250W, Input 9-40V and Output 3.3-24V or, 9-53V Input and 3.3V up to 40V Output
Ruggedized DC-DC Buck-Boost Converter	RGC	300W, Input 9-53V, Output 9.6-48V 8A or 5-28V 12.5A
DC-DC Buck-Boost Converter	i7C	300W, Input 9-53V or 9-36V, Output 9.6-48V 8A, 5-28V 12.5A or 8-24V 20A
DC-DC Buck Converter	i7A	500-750W, Input 18-60V or 18-32V, Output 3.3-24V 33A or 3.3-18V 45A
DC-DC Buck Converter	i6A4W	250W, Input 9 -53V, Output 3.3-40V 10A or 3.3-15V 20A
Non-Isolated DC-DC Converter	iCH	85W/12A, 4.5-14Vin, 0.7 - 8.5Vout, DOSA Compatible
Isolated DC-DC Converter	GQA	120W Industrial, Input 9-36V, Isolated Quarter Brick
Evaluation Board	i7X-C01-EVK-S0	Evaluation board with no module. Order required RGB part number separately.

Specification

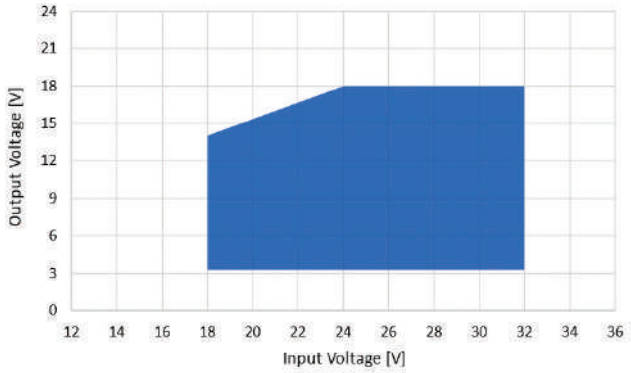
Model		RGB4W500W033A	RGB24750W045A	RGB12400W060A
Input				
Input Voltage Range	Vdc	18 - 60	18 - 32	9 - 18
Input Transient (t<100 ms)	Vdc	65 max	36 max	22 max
Input Current (max)	A	50	50	50
Turn-ON Input Voltage	Vdc	16.5 typical		8.1 typical
Turn-OFF Input Voltage	Vdc	15 typical		7.6 typical
Efficiency	%	91 - 98	93 - 98.5	86 - 97
Safety Certifications and Markings	-	CE, UKCA Mark		
Output				
Output Voltage Initial Setpoint	%	±2		
Output Voltage Tolerance	%	±3.5		
Output Voltage Adjustment Range	Vdc	3.3 - 24	3.3 - 18	0.8 - 8
Line Regulation	%	0.2		
Load Regulation	%	0.4		
Ripple & Noise (2)	mVpp	25		40
Output Current	A	0 - 33	0 - 45	0 - 60
Over Current Protection Threshold (typ)	A	45	63	70
Over Current Protection Limit Adjustment	-	See full specification for details.		
Short Circuit Current (Vo = 0.25V)	A	33	50	45
External Load Capacitance	uF	220 - 10000 (3)	330 - 10000 (3)	330 - 10000 (3)(4)
Switching Frequency	kHz	330 (fixed)		
Overtemperature Protection	°C	130 case, shutdown - autorecovery		
Output Voltage Adjustment Range	-	See full specification for output trim equation.		
Remote Sense	-	(+) Sense, compensating up to 5% of output voltage		
Remove On/Off	-	Negative Logic (Default)		
Environmental				
Operating Temperature (Tcase)	°C	-40 to 115		
Storage Temperature	°C	-55 to 125		
Humidity (non condensing)	%RH	10 - 95		
Cooling	-	Conduction Cooling		
Shock	-	MIL-STD-810G 516.6 Procedure I & IV		
Vibration	-	MIL-STD-810G 514.6 Procedure I, Cat 10		
Thermal Cycling Test (TCT)	-	700 cycles / -40 to 125°C, 60°C / minute ramp, 30 minute dwell time		
Other				
Weight (max)	g	68.1		
Size (LxWxH)	mm	38.1 x 49.5 x 13.0 38.1 x 39.4 x 13.0 (Mounting tab excluded)		
Size (LxWxH)	Inches	1.50 x 1.95 x 0.51 1.50 x 1.55 x 0.51 (Mounting tab excluded)		
MTBF - Telcordia SR-332 (100% Load, 40˚C)	MHrs	> 5		
Warranty	yrs	3		

Notes
(1) See website for detailed product specifications.
(2) Measured with one 22 µF ceramic capacitor, BW = 20MHz.
(3) Contact technical support for very low ESR capacitor banks or higher capacitance is required.
(4) For Vo ≤ 1.2V, 470µF min output capacitnace is recommended.

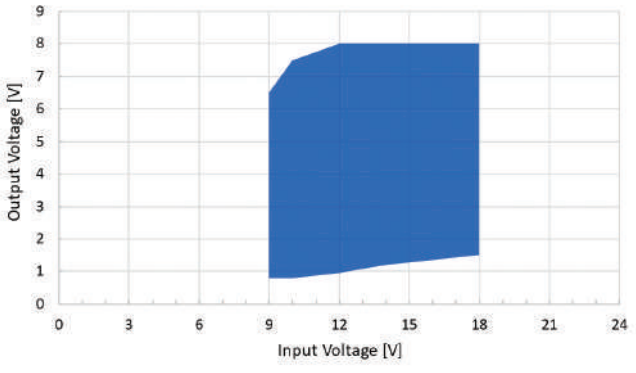
Input vs. Output Operating Range



RGB4W500W033A

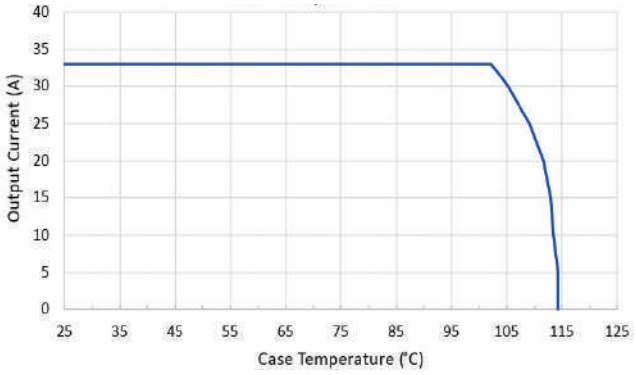


RGB24750W045A

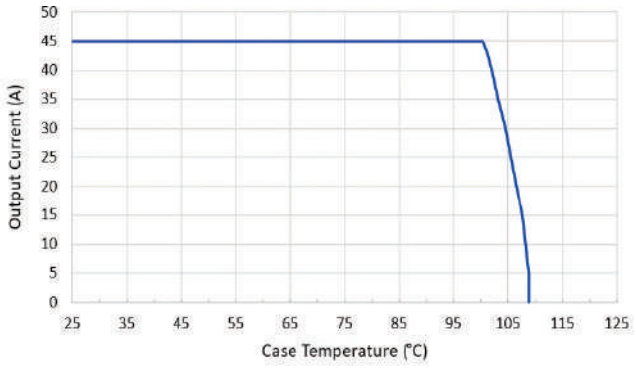


RGB12400W060A

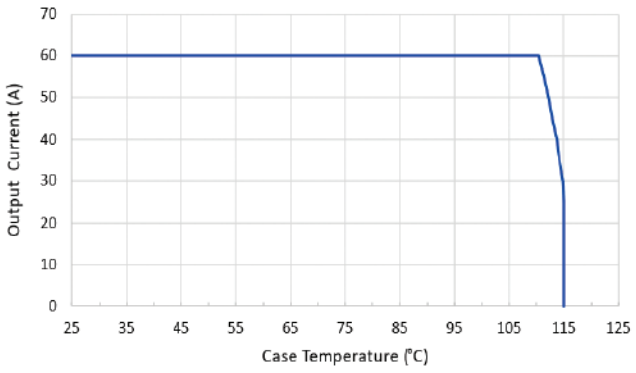
Typical Thermal Derating



RGB4W500W033A: Vin = 48V, Vo = 12V

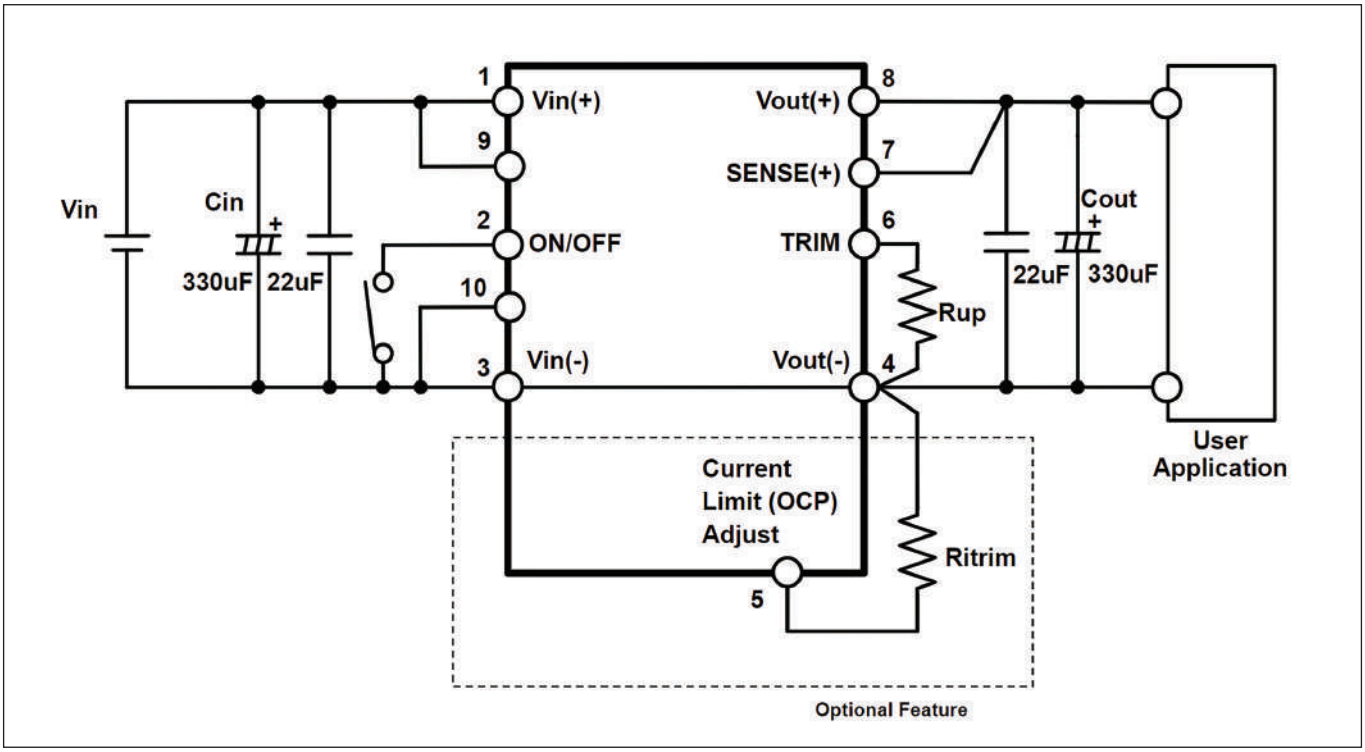


RGB24750W045A: Vin = 24V, Vo = 12V



RGB12400W060A: Vin = 12V, Vo = 5V

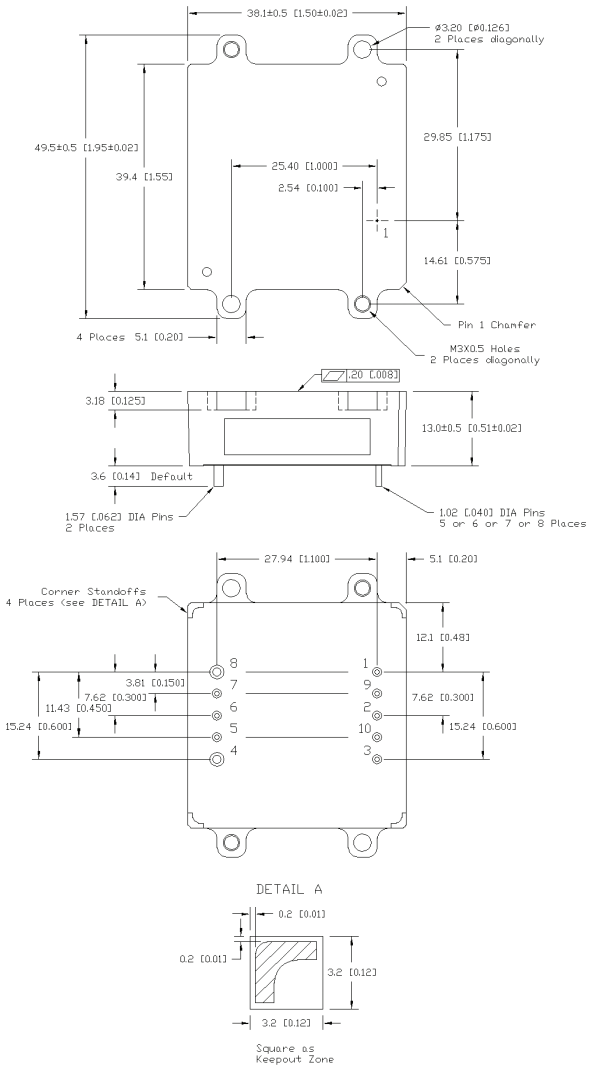
Typical Application Circuit



Notes:
1. The input and output capacitor values can vary based on the application requirements.
2. TRIM resistor “Rup” should be connected to the RGB module as close as possible.

Mechanical Specification

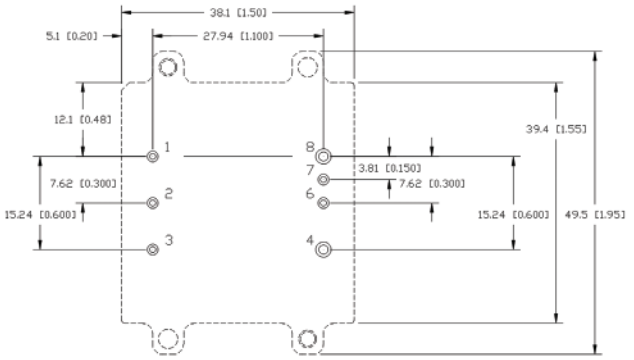
Outline Drawing



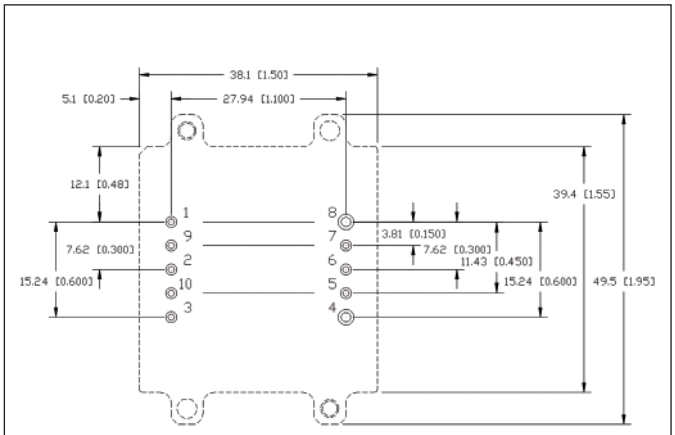
Note: (1) Dimensions are in mm [in]. Unless otherwise specified, tolerances are x.x ±0.5 [0.02], x.xx ±0.25 [0.010].
(2) Pin base material is brass or copper with gold over nickel plating.

* Pins 9 and 10 are present for products with rated output current of 45A and higher.
** Pin 5 is present for products with OCP Adjustment feature (-003 suffix).

Recommended PCB Hole Pattern (-001 Suffix or Io < 45A)



Recommended PCB Hole Pattern (-003 Suffix or Io ≥ 45A)



Pinout

PIN	Function	PIN	Function
1	VIN (+)	6	TRIM
2	ON / OFF	7	SENSE (+)
3	VIN (-) / GND	8	Vout (+)
4	VOUT (-) / GND	9*	Vin (+)
5**	OCP Adjustment	10*	Vin (-) / GND

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