DC – DC

Features

- 4:1 Wide Input Range
- Operating Temperature Range: -40~105°
- Approved to cURus, UKCA, C
- Safety Standards to IEC/UL/EN62368-1,EN45545-2
- Efficiency upto 90%
- EMC Class A &
- Single 150W Output Models
- Available with optional heatsink (HS)

Ideal Power's 43QAE150-xSyW 150W Series Pin Connection DC/DC Converters are certified to cURus, UKCA, CE, RoHS, REACH & IEC/UL/EN 62368-1, EN 50155, EN45545-2 Standards and comply with Efficiency Regulations. These are primarily used in ITE, Video & Audio, Railway Industries and customised solutions are available upon request.

Models

Model Number	Input Range	Output Voltage	Output Current @Full Load mA	Input Current @No Load mA	Efficiency %	Maximum Capacitor Load µF
43QAE150-24S3P3W	8.5~36	3.3	30	25	88	91000
43QAE150-24S05W	8.5~36	5	24	25	89	48000
43QAE150-24S12W	8.5~36	12	10	25	88	8300
43QAE150-24S15W	8.5~36	15	8	25	89	5300
43QAE150-24S24W	8.5~36	24	5	25	88	2100
43QAE150-24S30W	8.5~36	30	4	25	89	1300
43QAE150-24S48W	8.5~36	48	2.5	25	88	520
43QAE150-48S3P3W	16.5~75	3.3	30	15	88	91000
43QAE150-48S05W	16.5~75	5	24	15	89	48000
43QAE150-48S12W	16.5~75	12	10	15	89	8300
43QAE150-48S15W	16.5~75	15	8	15	90	5300
43QAE150-48S24W	16.5~75	24	5	15	90	2100
43QAE150-48S30W	16.5~75	30	4	15	90	1300
43QAE150-48S48W	16.5~75	48	2.5	15	90	520
43QAE150-110S3P3W	40~160	3.3	30	8	88	91000
43QAE150-110S05W	40~160	5	24	8	89	48000
43QAE150-110S12W	40~160	12	11	8	88	9170
43QAE150-110S15W	40~160	15	8.6	8	89	5730
43QAE150-110S24W	40~160	24	5.5	8	89	2290
43QAE150-110S30W	40~160	30	4.4	8	89	1470
43QAE150-110S48W	40~160	48	2.7	8	89	560

Input Specifications

Parameter	Conditions		Min	Typ	Max	Unit
Operating input voltage range		24Vin(nom)	8.5	24	36	
		48Vin(nom)	16.5	48	75	VDC
		110Vin(nom)	40	110	160	
Start up voltage		24Vin(nom)			9	
		48Vin(nom)			18	VDC
		110Vin(nom)			43	
Shutdown voltage		24Vin(nom)	7.3	7.7	8.1	
		48Vin(nom)	15.5	15.9	16.3	VDC
		110Vin(nom)	33.0	34.5	36.0	
Start up time	Constant resistive load	Power up		75	100	ms
		Remote ON/OFF		75	100	
Input surge voltage		24Vin(nom)			50	
	1 second, max.	48Vin(nom)			100	VDC
		110Vin(nom)			185	
Input filter (1)				Pi type		
Remote ON/OFF	Referred to –Vin pin	Negative logic (Standard) DC-DC ON		Short or 0 ~ 1.2VDC		
		Negative logic (Standard) DC-DC OFF		Open or 3 ~ 12VDC		
		Positive logic (Option) DC-DC ON		Open or 3 ~ 12VDC		
		Positive logic (Option) DC-DC OFF		Short or 0 ~ 1.2VDC		
		Input current of Ctrl pin	-0.5		1	mA
		Remote off input current		3		mA

Output Specifications

Parameter	Conditions		Min	Typ	Max	Unit
Voltage accuracy			-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load		-0.1		+0.1	%
Load regulation	No Load to Full Load	3.3 & 5Vout	-0.2		+0.2	%
		Others	-0.1		+0.1	
Voltage adjustability	Maximum output deviation is inclusive of remote sense		-20		+10	%
Remote sense	% of Vout(nom). if remote sense is not being used, sense pins should connect to the output pins with the same polarity.				10	%
Ripple and noise	Measured by 20MHz bandwidth					
	With a 22µF/25V X7R MLCC	3.3Vout, 5Vout		75		
	With a 22µF/25V X7R MLCC	12Vout, 15Vout		100		mVp-p
	With a 4.7µF/50V X7R MLCC	24Vout, 30Vout		200		
	With a 2.2µF/100V X7R MLCC	48Vout		300		
Temperature coefficient			-0.02		+0.02	%/°C
Transient response recovery time	25% load step change			250		µs
Over voltage protection	% of Vout(nom); Hiccup mode		115		130	%
Overload protection	% of Iout rated; Hiccup mode		110		140	%
Short circuit protection			Continuous, automatics recovery			

General Specifications

Parameter	Conditions			Min	Typ	Max	Unit
Isolation voltage	1 minute	110Vin(nom	Input to Output	3000			VAC
	(Reinforced insulation)		Input (Output) to Base-Plate	1500			
	1 minute	Others	Input to Output	2250			VDC
	(Basic insulation)		Input (Output) to Base-Plate	2250			
Isolation resistance	500VDC			1			GΩ
Isolation capacitance						1500	pF
Switching frequency				270	300	330	kHz
Safety approvals	IEC/ EN/ UL62368-1						UL:E193009
							CB:UL(Demko)
Standard approvals	EN50155						
	EN45545-2						
Case material							Aluminum base-plate with plastic case
Potting material							Silicone (UL94 V-0)
Weight							64g (2.26oz)
MTBF	MIL-HDBK-217F, Full load						3.684 x 105 hrs

Environmental Specifications

Parameter	Conditions	Min	Typ	Max	Unit
Operating base-plate temperature		-40		+105	℃
Maximum case temperature				105	℃
Over temperature protection			110		℃
Storage temperature range		-55		+125	℃
Thermal impedance	Module without assembly option		9		
	Only mount on the iron base-plate		2.8		
	Heat-sink type with 0.24" Height		7.1		℃/W
	Heat-sink type with 0.5" Height		5.5		
	Heat-sink type with 0.65" Height		4.0		
	Heat-sink type with 1" Height		3.2		
Thermal shock					MIL-STD-810F
Shock					EN61373, MIL-STD-810F
Vibration					EN61373, MIL-STD-810F
Relative humidity					5% to 95% RH

DC – DC

EMC Specifications

Parameter		Conditions	Level
EMI	EN55011, EN55032	With external components	Class A, Class B
EMS	EN55024		
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	20 V/m	Perf. Criteria A
Fast transient	EN61000-4-4 43QAE150-24S☐☐U 43QAE150-48S☐☐U 43QAE150-110S☐☐W	± 2kV With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220µF/100V) With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KXJ series, 100µF/250V)	Perf. Criteria A
Surge	EN61000-4-5 43QAE150-24S☐☐U 43QAE150-48S☐☐U 43QAE150-110S☐☐W	EN55024:±1kV and EN50155:±2kV With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220µF/100V) With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KXJ series, 100µF/250V)	Perf. Criteria A
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A

Note:

1. Input source impedance: The power module will operate as specifications without external components, assuming that the source voltage has a very low impedance and reasonable input voltage regulation. Highly inductive source impedances can affect the stability of the power module. Since real-world voltage source has finite impedance, performance can be improved by adding external filter capacitor.

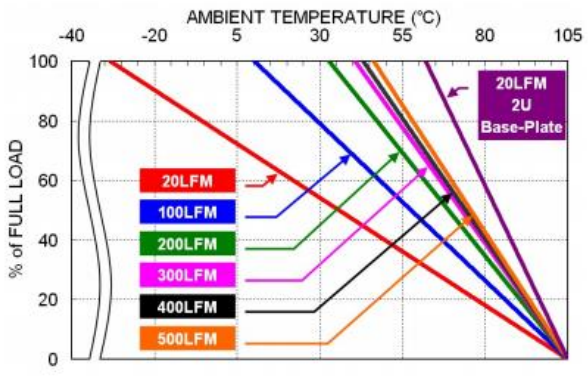
The 43QAE150-24S00W and 43QAE150-48S00W recommended Nippon Chemi-con KY series, 100µF/100V.

The 43QAE150-110S00W recommended Ruby-con BXF series, 39µF/200V.

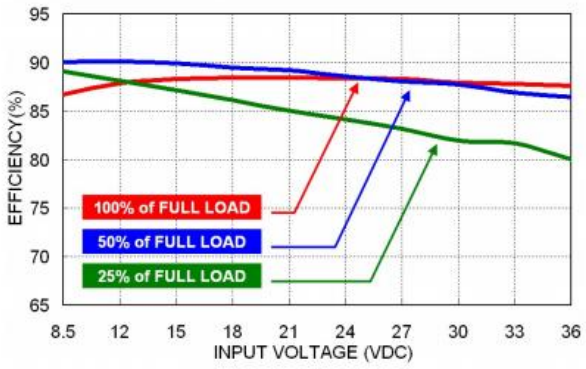
2. BASE-PLATE GROUNDING: When connect two screw bolts to shield plane, the EMI could be reduced.

CAUTION: This power module is not internally fused. An input line fuse must always be used.

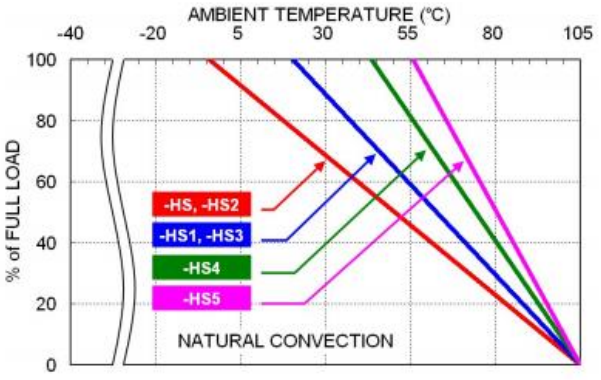
Characteristic Curve



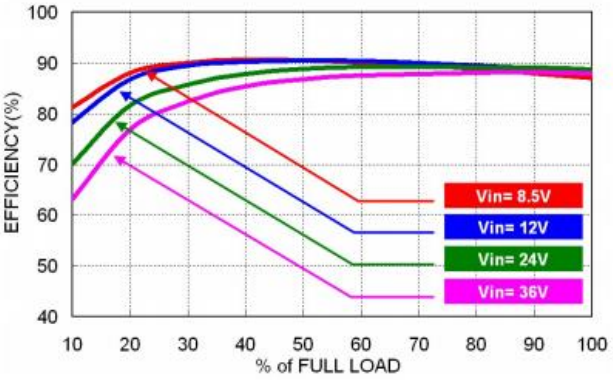
43QAE150-24S05W Derating Curve (See Thermal Considerations)



43QAE150-24S05W Efficiency vs. Input Voltage



43QAE150-7224S05W Derating Curve with Heat-sink (See Thermal Considerations)



43QAE150-24S05W Efficiency vs. Output Load

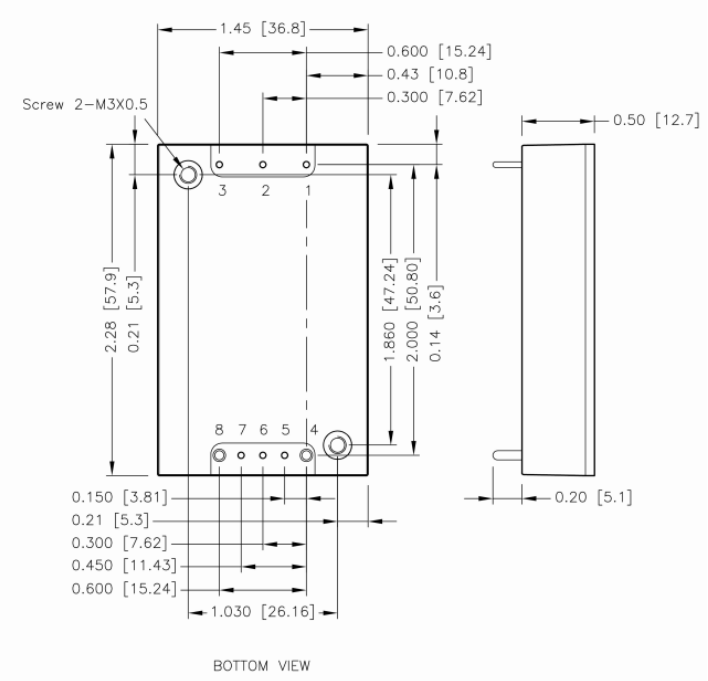
Fuse Consideration

This power module is not internally fused. An input line fuse must always be used. This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.
The input line fuse suggest as below ：

Model	Fuse Rating (A)	Fuse Type
43QAE150-24S□□W	25	Fast-Acting
43QAE150-48S□□W	12	Fast-Acting
43QAE150-110S□□W	6.3	Slow-Blow

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

Mechanical Drawing

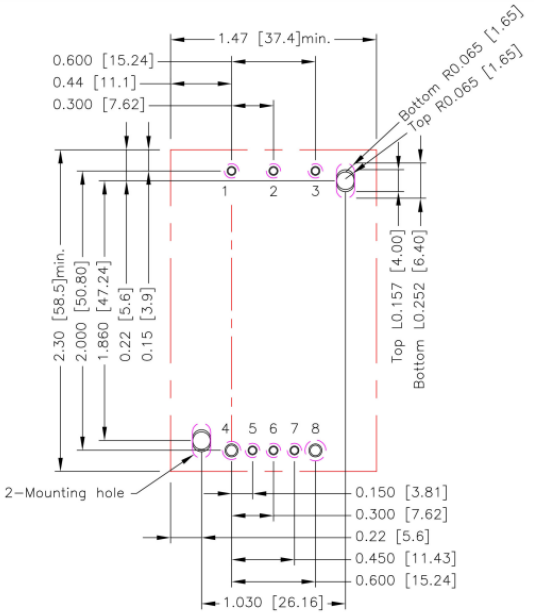


PIN CONNECTION

PIN	DEFINE	DIAMETER
1	- Vin	0.04 Inch
2	Ctrl	0.04 Inch
3	+ Vin	0.04 Inch
4	- Vout	0.06 Inch
5	- Sense	0.04 Inch
6	Trim	0.04 Inch
7	+ Sense	0.04 Inch
8	+ Vout	0.06 Inch

1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
   x.xxx±0.010 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]
4. The screw locked torque:MAX 3.5kgf-cm [0.34N-m]

Recommended Pad Layout

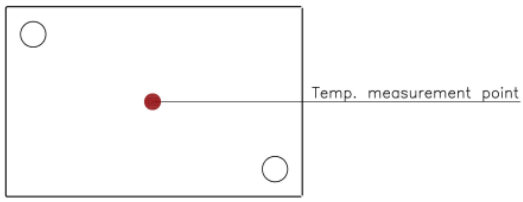


All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.5.6.7: ∅0.051[1.30]
Through hole 4.8: ∅0.075[1.90]
Through hole of mounting: ∅0.126[3.20]
Top view pad 1.2.3.5.6.7: ∅0.064[1.63]
Top view pad 4.8: ∅0.094[2.38]
Top view pad of mounting:Groove R0.065[1.65]L0.157[4.00]
Bottom view pad 1.2.3.5.6.7: ∅0.102[2.60]
Bottom view pad 8: ∅0.150[3.80]
Bottom view pad 4: ∅0.130[3.30]
Bottom view pad of mounting:Groove R0.065[1.65]L0.252[6.40]

Thermal Considerations

The power module operates in a variety of thermal environments.
However, sufficient cooling should be provided to help ensure reliable operation of the unit.
Heat is removed by conduction, convection, and radiation to the surrounding Environment.
Proper cooling can be verified by measuring the point as the figure below.
The temperature at this location should not exceed “Maximum case temperature”.
When Operating, adequate cooling must be provided to maintain the test point temperature at or below “Maximum case temperature”.
You can limit this Temperature to a lower value for extremely high reliability.

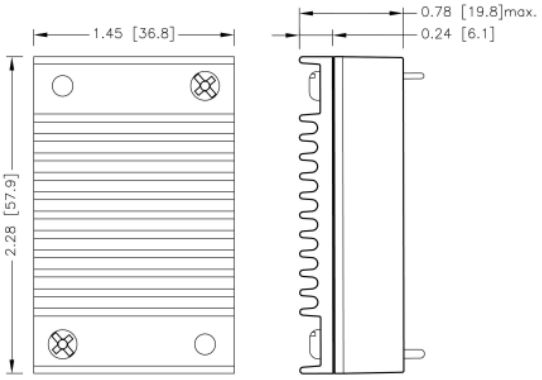
- Thermal test condition with vertical direction by natural convection (20LFM).
- The iron base-plate dimension is 19” X 3.5” X 0.063” (The height is EIA standard 2U).
- The heat-sink is optional and P/N: 7G-0029B-F, 7G-0030B-F, 7G-0031B-F, 7G-0032B-F, 7GA0124P01-F, 7GA0125P01-F



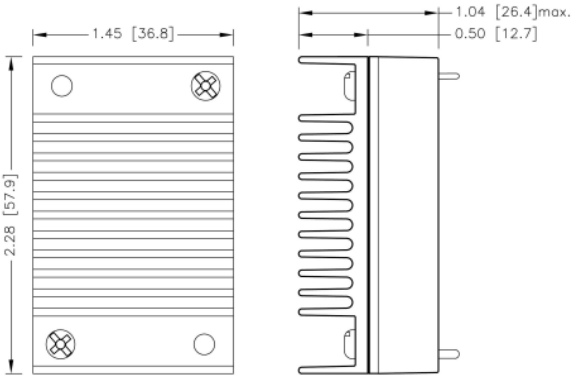
BASE PLATE

Heat-Sink Type Options

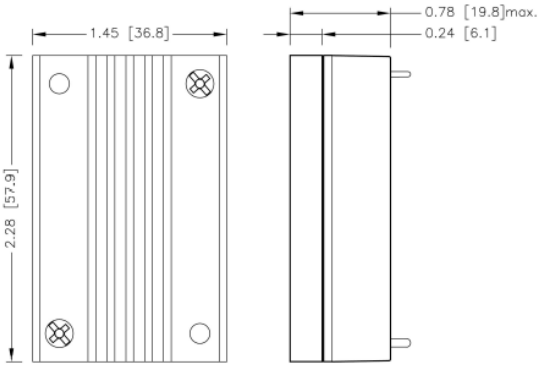
43QAE150-00S00W –HS
7G-0029B-F



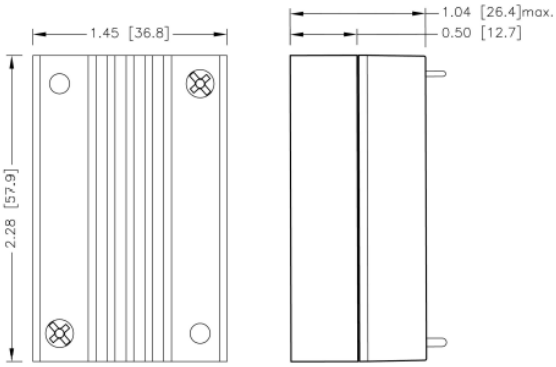
43QAE150-00S00W –HS1
7G-0030B-F



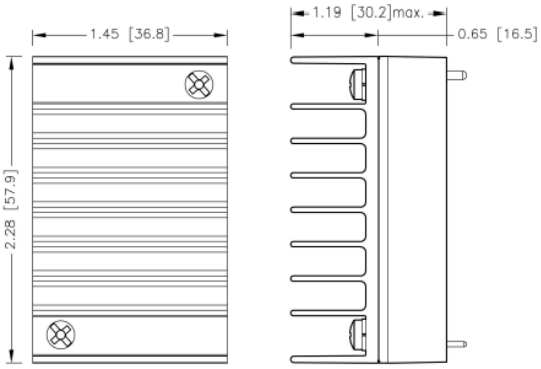
43QAE150-00S00W –HS2
7G-0031B-F



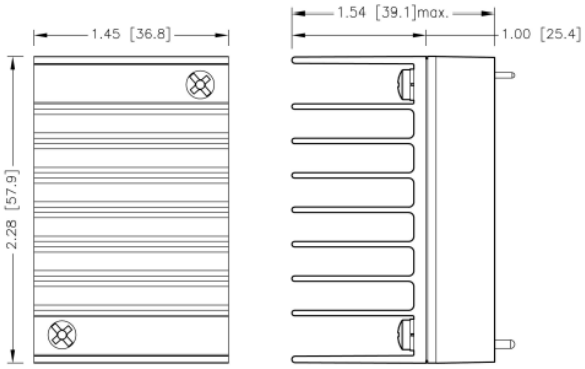
43QAE150-00S00W –HS3
7G-0032B-F



43QAE150-00S00W –HS4
7GA0124P01-F



43QAE150-00S00W –HS5
7GA0125P01-F



1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]

Output Voltage Adjustment

Output voltage is adjustable for 10% trim up or -20% trim down of nominal output voltage by connecting an external resistor between the Trim pin and either the +Sense or -Sense pins. With an external resistor between the Trim and -Sense pin, the output voltage set point decreases. With an external resistor between the Trim and +Sense pin, the output voltage set point increases. Maximum output deviation is +10% inclusive of remote sense. The external TRIM resistor needs to be at least 1/8W of rated power.

Trim Up Equation

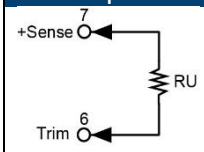
$$R_U = \left(\frac{5.11V_{OUT}(100+\Delta\%)}{1.225\Delta\%} - \frac{511+10.22\Delta\%}{\Delta\%}\right)k\Omega$$

Trim Down Equation

$$R_D = \left(\frac{511}{\Delta\%} - 10.22\right)k\Omega$$

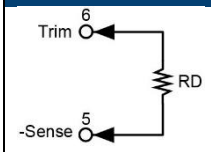
EXTERNAL OUTPUT TRIMMING
Output can be externally trimmed by using the method shown below.

Trim Up



□□S3P3W										
△V %)	1	2	3	4	5	6	7	8	9	10
Vout V)	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630
RU (kΩ)	869.117	436.331	292.07	219.939	176.66	147.808	127.198	111.742	99.72	90.103
□□S05W										
△V (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45	5.50
RU (kΩ)	1585.35	797.994	535.542	404.316	325.58	273.09	235.596	207.476	185.605	168.109
□□S12W										
△V (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20
RU (kΩ)	4534.55	2287.19	1538.08	1163.52	938.78	788.956	681.939	601.676	539.25	489.309
□□S15W										
△V (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50
RU (kΩ)	5798.49	2925.42	1967.73	1488.89	1201.58	1010.04	873.229	770.619	690.812	626.966
□□S24W										
△V (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	24.24	24.48	24.72	24.96	25.20	25.44	25.68	25.92	26.16	26.40
RU (kΩ)	9590.32	4840.11	3256.7	2465	1989.98	1673.3	1447.1	1277.45	1145.5	1039.94
□□S30W										
△V (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	30.3	30.6	30.9	31.2	31.5	31.8	32.1	32.4	32.7	33
RU (kΩ)	12118.2	6116.57	4116.02	3115.74	2515.58	2115.47	1829.68	1615.33	1448.62	1315.25
□□S48W										
△V (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	48.48	48.96	49.44	49.92	50.40	50.88	51.36	51.84	52.32	52.80
RU (kΩ)	19701.9	9945.94	6693.96	5067.97	4092.38	3441.99	2977.42	2628.99	2357.99	2141.19

Trim Down



□□S□□W										
△V (%)	1	2	3	4	5	6	7	8	9	10
RD (kΩ)	500.78	245.28	160.113	117.53	91.98	74.947	62.78	53.655	46.558	40.88
△V (%)	11	12	13	14	15	16	17	18	19	20
RD (kΩ)	36.235	32.363	29.088	26.28	23.847	21.718	19.839	18.169	16.675	15.33

DC – DC