

Features

Regulated Converters

- 2:1 Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 88%
- Six-Sided Continuous Shield
- Fixed Operating Frequency

RECOM
DC/DC Converter

RP15-F

15 Watt
2" x 1"
Single & Dual
Output



Description

The RP15-F series DC/DC converters are certified to UL 60950-1 and to cUL 60950-1. This makes them ideal for all telecom and industrial applications where approved safety standards are required. The industry standard 2" x 1" package meets military standards for thermal shock and vibration tolerance.

Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input ⁽¹⁾ Current [mA]	Efficiency ⁽¹⁾ typ. [%]	Max. Capacitive Load ⁽²⁾ [μF]
RP15-123.3SF ^(3,4)	9-18	3.3	4000	1392	79	10200
RP15-1205SF ^(3,4)	9-18	5	3000	1524	82	7050
RP15-1212SF ^(3,4)	9-18	12	1250	1453	86	1035
RP15-1215SF ^(3,4)	9-18	15	1000	1453	86	705
RP15-243.3SF ^(3,4)	18-36	3.3	4000	688	80	10200
RP15-2405SF ^(3,4)	18-36	5	3000	744	84	7050
RP15-2412SF ^(3,4)	18-36	12	1250	735	85	1035
RP15-2415SF ^(3,4)	18-36	15	1000	735	85	705
RP15-483.3SF ^(3,4)	36-75	3.3	4000	340	81	10200
RP15-4805SF ^(3,4)	36-75	5	3000	377	83	7050
RP15-4812SF ^(3,4)	36-75	12	1250	359	87	1035
RP15-4815SF ^(3,4)	36-75	15	1000	363	86	705
RP15-1205DF ^(3,4)	9-18	±5	±1500	1506	83	±1020
RP15-1212DF ^(3,4)	9-18	±12	±625	1453	86	±495
RP15-1215DF ^(3,4)	9-18	±15	±500	1488	84	±165
RP15-2405DF ^(3,4)	18-36	±5	±1500	744	84	±1020
RP15-2412DF ^(3,4)	18-36	±12	±625	727	86	±495
RP15-2415DF ^(3,4)	18-36	±15	±500	727	86	±165
RP15-4805DF ^(3,4)	36-75	±5	±1500	368	85	±1020
RP15-4812DF ^(3,4)	36-75	±12	±625	355	88	±495
RP15-4815DF ^(3,4)	36-75	±15	±500	359	87	±165

Notes:

Note1: Maximum value at nominal input voltage and full load.

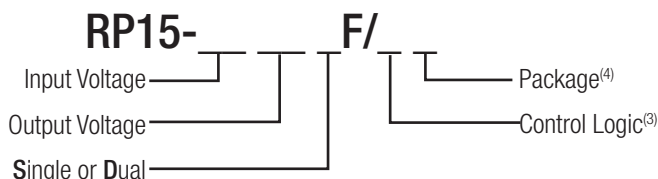
Note2: Test by minimum Vin and constant resistor load.



UL
C196683

UL60950-1 Certified

Model Numbering



Ordering Examples

RP15-2405SF/P = 24V Input, 5V Output, Positive Logic CTRL pin fitted

RP15-4805DF-HC = 48V Input, ±5V Output, No CTRL pin, Heat-sink fitted

Notes:

Note3: Standard part is without suffixes and Trim and CTRL pins aren't fitted.

add suffix "P" for CTRL function with positive logic (1=ON, 0=OFF)

add suffix "N" for CTRL function with negative logic (0=ON, 1=OFF)

Note4: add suffix -HC for premounted Heat-sink and clips

Specifications measured at $T_a = 25^\circ\text{C}$, nominal input voltage, full load otherwise noted

BASIC CHARACTERISTICS

Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range	nom. Vin = 12V nom. Vin = 24V nom. Vin = 48V	9VDC 18VDC 36VDC	12VDC 24VDC 48VDC	18VDC 36VDC 75VDC
Under Voltage Lockout (UVLO)		none		
Input Filter		Pi-Type		
Input Reflected Ripple Current ⁽⁶⁾	nominal Vin and full load		20mA _{p-p}	
Input Surge Voltage	Vin = 12V, 100ms max. Vin = 24V, 100ms max. Vin = 48V, 100ms max.			36VDC 50VDC 100VDC
Start-up time	Power up		20ms	
Operating Frequency Range	measured by 20MHz bandwidth Single Dual	450kHz 270kHz	500kHz 300kHz	550kHz 330kHz
Minimum Load ⁽⁷⁾	of full load	10%		
Ripple and Noise	Single Dual		50mV _{p-p} 75mV _{p-p}	
Remote ON/OFF ⁽⁸⁾	Positive logic	DC-DC ON DC-DC OFF	Open or $3.5\text{V} < V_r < 12\text{V}$ Short or $0\text{V} < V_r < 1.2\text{V}$	
	Negative Logic	DC-DC ON DC-DC OFF	Short or $0\text{V} < V_r < 1.2\text{V}$ Open or $3.5\text{V} < V_r < 12\text{V}$	
Input current of Remote pin (CTRL)		DC-DC OFF	20mA	
		DC-DC ON	-0.5mA	+1.0mA

Notes:

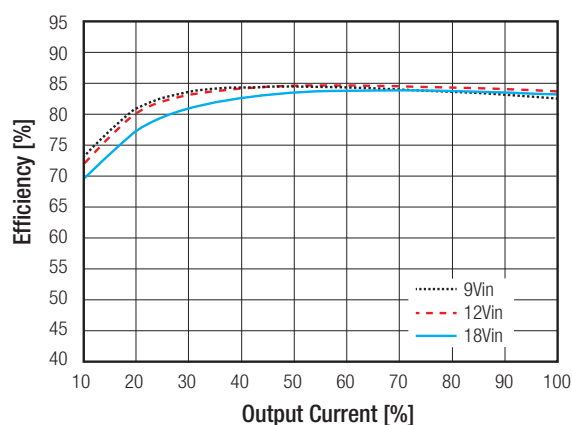
Note6: Simulated source impedance of 12 μH . 12 μH inductor in series with +Vin.

Note7: The RP15 series requires a minimum of 10% loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.

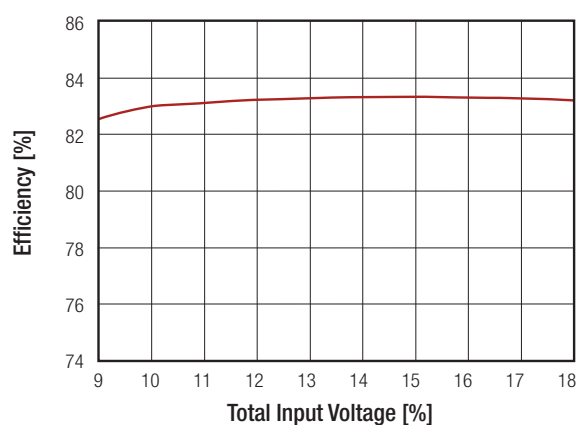
Note8: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin.

RP15-1205SF

Efficiency vs. Output Current



Efficiency vs. Input Voltage

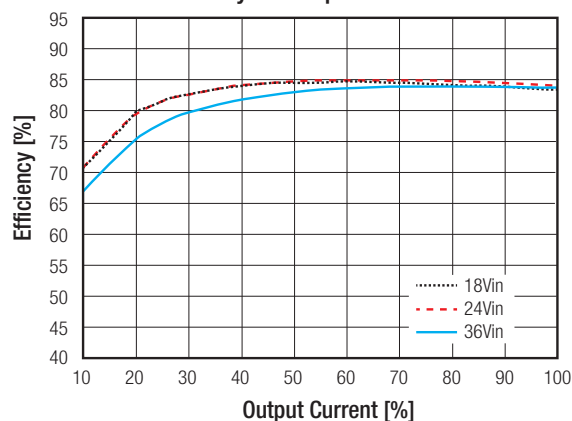


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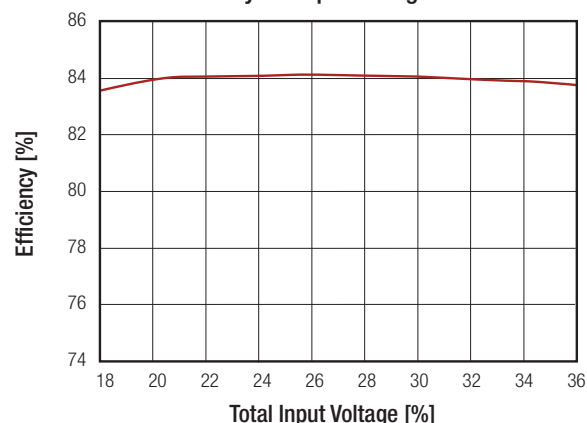
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

RP15-2405SF

Efficiency vs. Output Current

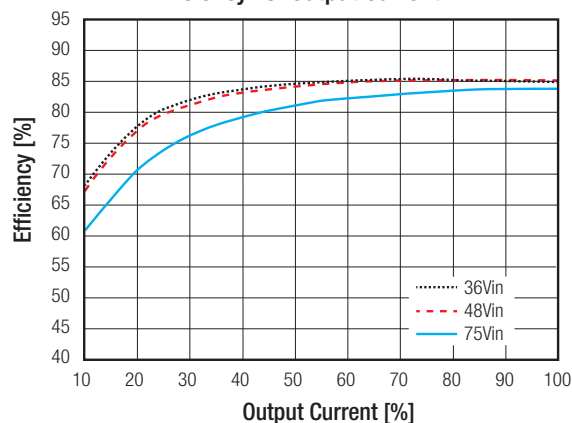


Efficiency vs. Input Voltage

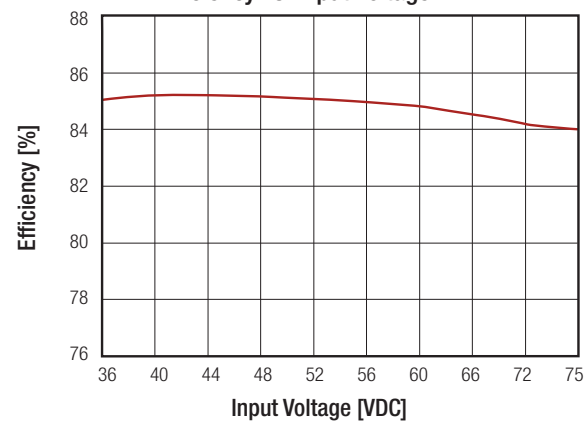


RP15-4805SF

Efficiency vs. Output Current



Efficiency vs. Input Voltage



REGULATIONS

Parameter	Condition		Value
Output Voltage Accuracy	full load and nominal Vin		±1%
Line Voltage Regulation	low line to high line at full load		±0.5%
Load Voltage Regulation	10% to 100% load	Single	±0.5%
		Dual	±0.1%
Cross Regulation	asymmetrical 25%<>100% load		±5%
Transient Response recovery time	25% load step change		250µs typ.

PROTECTIONS

Parameter	Condition		Value
Short Circuit Protection (SCP)			continuous, automatic recovery
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout	3.9V
		5Vout	6.2V
		12Vout	15V
		15Vout	18V
Over Load Protection (OLP)	% of Iout rated		150% typ.
Isolation Voltage	I/P to O/P		1.6kVDC/1 minute
	I/P (O/P) to case		1.6kVDC/1 minute
Isolation Resistance	500VDC		1GΩ min.
Isolation Capacitance			300pF typ.

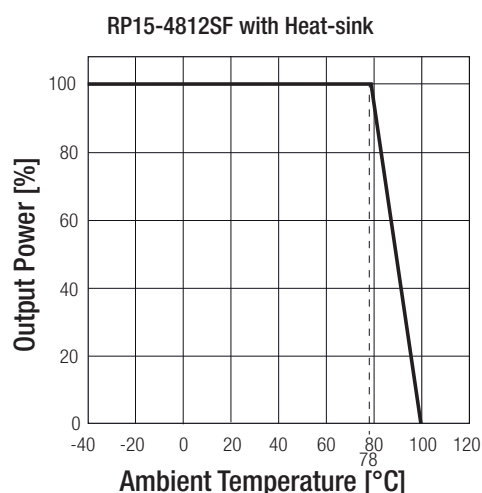
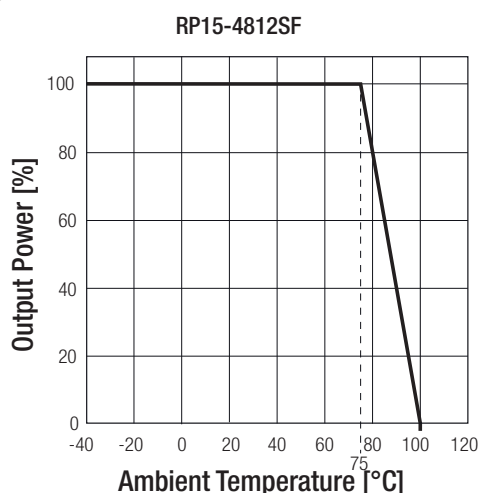
Notes:

Note9: This power module is not internally fused. An input line fuse must always be used.

Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

ENVIRONMENTAL		
Parameter	Condition	Value
Operating Temperature Range	without derating	-40°C to +75°C
	with derating	-40°C to +100°C
Maximum Case Temperature		+100°C
Temperature Coefficient		±0.02%/°C max.
Thermal Impedance	Natural convection (20LFM)	12°C/Watt
	Natural convection (20LFM) with Heat-sink	10°C/Watt
Operating Humidity		5% - 95% RH
Thermal Shock		MIL-STD-810F
Vibration		MIL-STD-810F
MTBF	MIL-HDBK-217F	2318 x 10 ³ hours
	Bellcore TR-NWT-000332 ⁽¹⁰⁾	2041 x 10 ³ hours

Derating Graph⁽¹¹⁾



Notes:

Note10: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment).

Note11: Derating graphs are valid only for the shown part numbers. If you need detailed derating-information about a part-number not shown here please contact our technical support service at techsupportAT@recom-power.com

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	Report / File Number	Standard
UL General Safety	E196683	UL60950-1 1st Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003
EMC Compliance	Condition	Standard / Criterion
EMI Standard ⁽¹²⁾	with external filter	EN55022, Class A or B
ESD	Air ±8kV and Contact ± 6kV	EN61000-4-2, Criteria B
Radiated Immunity	v10 V/m	EN61000-4-3, Criteria A
Fast Transient ⁽¹³⁾	±2kV	EN61000-4-4, Criteria B
Surge ⁽¹³⁾	±1kV	EN61000-4-5, Criteria B
Conducted Immunity	10 Vr.m.s	EN61000-4-6, Criteria A

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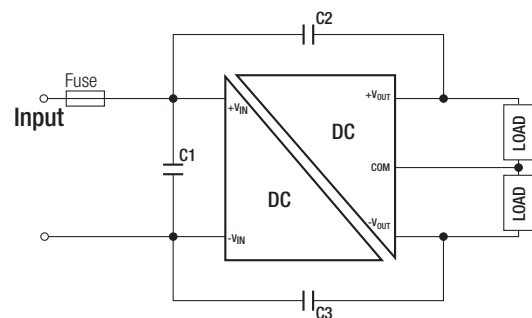
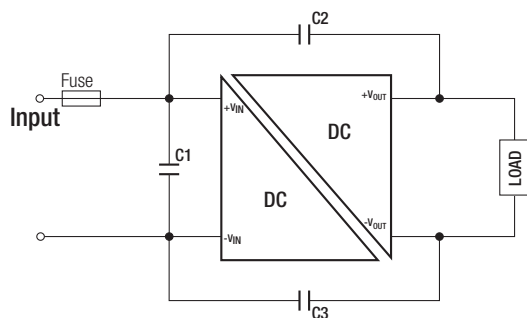
Specifications measured at $T_a = 25^\circ\text{C}$, nominal input voltage, full load otherwise noted

Notes:

Note10: The standard modules meet EMI Class A or Class B with external components, see filter suggestions below.

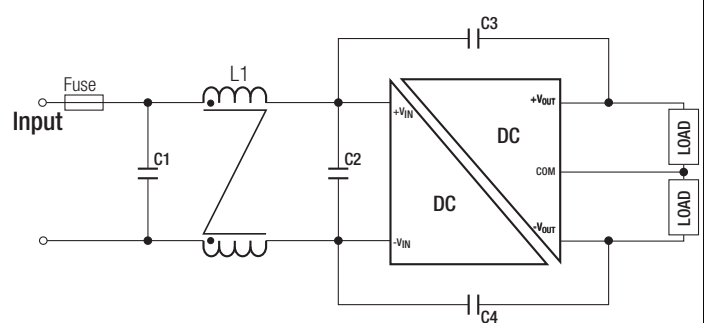
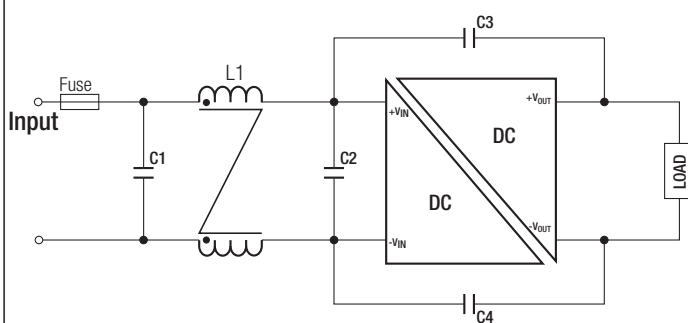
Note11: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Recom suggests: Nippon chemi-con KY series, 220 μF /100V.

EMI Filtering Class A



MODEL	C1	C2	C3
RP15-12xxS_DF	6.8 μF /50V 1812 MLCC	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC
RP15-24xxS_DF	2.2 μF /50V 1812 MLCC	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC
RP15-48xxS_DF	1.5 μF /100V 1812 MLCC	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC

EMI Filtering Class B



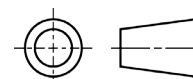
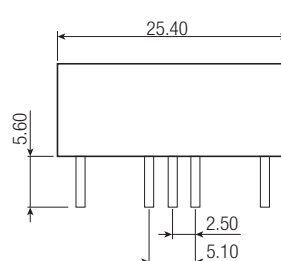
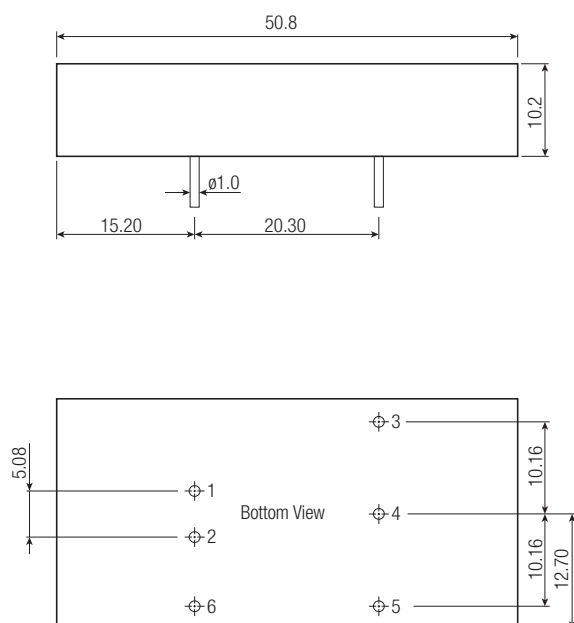
MODEL	C1	C2	C3/C4	L1
RP15-12xxS_DF	4.7 μF /50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 325 μH ref.: WE 744290321 ref.: CMC-06
RP15-24xxS_DF	3.3 μF /50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 325 μH ref.: WE 744290321 ref.: CMC-06
RP15-48xxS_DF	2.2 μF /100V 1812 MLCC	2.2 μF /100V 1812 MLCC	1000pF/2kV 1808 MLCC	CMC: 325 μH ref.: WE 744290321 ref.: CMC-06

Specifications measured at $T_a = 25^{\circ}\text{C}$, nominal input voltage, full load otherwise noted

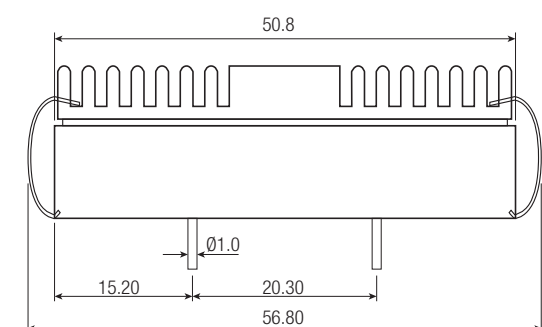
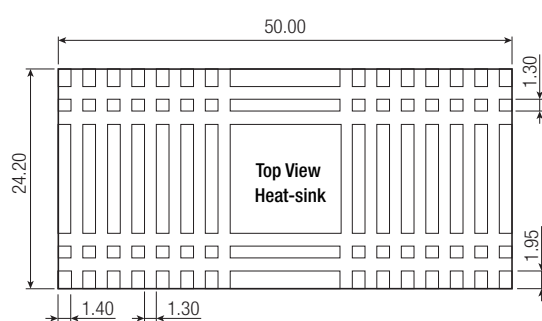
DIMENSIONS and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case Base Potting	Nickel coated copper non-conductive black plastic Epoxy (UL94-V0)
Package Dimensions (LxWxH)	without Heat-sink with Heat-sink	50.8 x 25.4 x 10.2mm 56.8 x 25.4 x 16.8mm
Package Weight	without Heat-sink with Heat-sink	27g 37.89g

Dimension Drawing (mm)



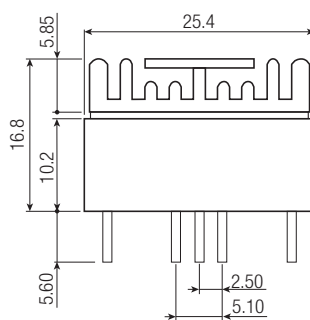
Dimension Drawing (mm) with Heat-sink



Pin Connections

Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	No Pin	Com
5	-Vout	-Vout
6*	CTRL*	CTRL*

* Optional. See Note 8
Pin Pitch Tolerance ± 0.25 mm
Pin Dimension Tolerance ± 0.1 mm
X.X ± 0.5 mm
X.XX ± 0.25 mm



Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

PACKAGING INFORMATION			
Parameter	Type		Value
Packaging Quantity	without Heat-sink	Tube	9pcs.
	with Heat-sink	Tray	20pcs.
Storage Temperature Range			-55°C to +125°C
Storage Humidity			5% - 95% RH

Mouser Electronics

Authorized Distributor

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RECOM:

RP15-1205DF	RP15-1205DF/N	RP15-1205DF/N-HC	RP15-1205DF/P	RP15-1205DF/P-HC	RP15-1205DF-HC
RP15-1205SF	RP15-1205SF/N	RP15-1205SF/N-HC	RP15-1205SF/P	RP15-1205SF/P-HC	RP15-1205SF-HC
RP15-1212DF	RP15-1212DF/N	RP15-1212DF/N-HC	RP15-1212DF/P	RP15-1212DF/P-HC	RP15-1212DF-HC
RP15-1212SF	RP15-1212SF/N	RP15-1212SF/N-HC	RP15-1212SF/P	RP15-1212SF/P-HC	RP15-1212SF-HC
RP15-1215DF	RP15-1215DF/N	RP15-1215DF/N-HC	RP15-1215DF/P	RP15-1215DF/P-HC	RP15-1215DF-HC
RP15-1215SF	RP15-1215SF/N	RP15-1215SF/N-HC	RP15-1215SF/P	RP15-1215SF/P-HC	RP15-1215SF-HC
RP15-123.3SF	RP15-123.3SF/N	RP15-123.3SF/N-HC	RP15-123.3SF/P	RP15-123.3SF/P-HC	RP15-123.3SF-HC
RP15-2405DF	RP15-2405DF/N	RP15-2405DF/N-HC	RP15-2405DF/P	RP15-2405DF/P-HC	RP15-2405DF-HC
RP15-2405SF	RP15-2405SF/N	RP15-2405SF/N-HC	RP15-2405SF/P	RP15-2405SF/P-HC	RP15-2405SF-HC
RP15-2412DF	RP15-2412DF/N	RP15-2412DF/N-HC	RP15-2412DF/P	RP15-2412DF/P-HC	RP15-2412DF-HC
RP15-2412SF	RP15-2412SF/N	RP15-2412SF/N-HC	RP15-2412SF/P	RP15-2412SF/P-HC	RP15-2412SF-HC
RP15-2415DF	RP15-2415DF/N	RP15-2415DF/N-HC	RP15-2415DF/P	RP15-2415DF/P-HC	RP15-2415DF-HC
RP15-2415SF	RP15-2415SF/N	RP15-2415SF/N-HC	RP15-2415SF/P	RP15-2415SF/P-HC	RP15-2415SF-HC
RP15-243.3SF	RP15-243.3SF/N	RP15-243.3SF/N-HC	RP15-243.3SF/P	RP15-243.3SF/P-HC	RP15-243.3SF-HC
RP15-4805DF	RP15-4805DF/N	RP15-4805DF/N-HC	RP15-4805DF/P	RP15-4805DF/P-HC	RP15-4805DF-HC
RP15-4805SF	RP15-4805SF/N	RP15-4805SF/N-HC	RP15-4805SF/P	RP15-4805SF/P-HC	RP15-4805SF-HC
RP15-4812DF	RP15-4812DF/N	RP15-4812DF/N-HC	RP15-4812DF/P		