

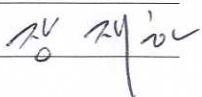


귀중

Evaluation Data

품 목	SMPS
품 명	JSF100-S
Rev. No.	A

2012 년 9 월 14 일

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Evaluation data

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1-1. JSF100-3R3 Input Characteristics

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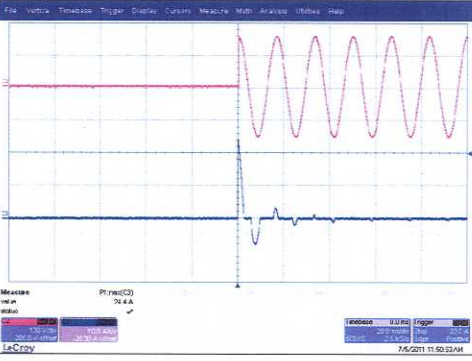
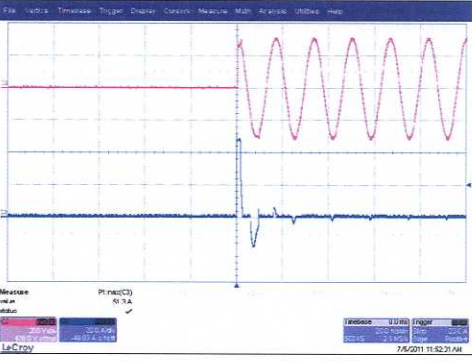
(1) Oscilloscope: WavePro 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : INPUT CURRENT - AP015 Current probe (BANDWIDTH: 200MHz)

(2) Power Analyzer: 3332 (HIOKI)

(3) Leakage Current Tester: 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고			
Inrush Current Characteristics (110V)							
AC110V	$I_o=100\%$ (20A)	$I_{rush} = 24.4 [A]$		CH2(전압) 100V/div 20ms/div CH3(전류) 10A/div 10ms/div			
Inrush Current Characteristics (220V)							
AC220V	$I_o=100\%$ (20A)	$I_{rush} = 51.3 [A]$		CH2(전압) 200V/div 20ms/div CH3(전류) 20A/div 20ms/div			
Input Current & Efficiency Characteristics Condition Ta : 25°C							
I_o \ V_{in}		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current (A)	0.058	0.051	0.05	0.055	0.06	0.063
	Efficiency (%)	-	-	-	-	-	-
Load (50%) 15A	Input Current (A)	0.9	0.76	0.66	0.51	0.45	0.4
	Efficiency (%)	76	76.8	77	76.1	75.3	74
Load (100%) 30A	Input Current (A)	1.81	1.5	1.28	1.01	0.86	0.76
	Efficiency (%)	72.3	74.1	75.2	76.2	76	75.6
Leakage Current Characteristics Condition Ta : 25°C							
I_o \ V_{in}		88V	110V	220V	264V	-	-
Line L (mA)		0.34	0.39	0.65	0.7	-	-
Line N (mA)		0.34	0.38	0.66	0.7	-	-

1-2. JSF100-3R3 Output Characteristics

< 측정기 >

(1) Oscilloscope: WAVESURFER 454 (LeCroy)

◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive Voltage probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe (BANDWIDTH: 200MHz)

◇ CH4 : BNC Cable 1.5m, 50Ω (BANDWIDTH: 200MHz)

(2) Digital Multi Meter: 2000 (KEITHLEY)

Line & Load Regulation Characteristics							Condition Ta : 25 °C	
I_o \ V_{in}	88V	110V	132V	170V	220V	264V	Line Regulation (mV)	
Load (0A)	3.337	3.337	3.337	3.337	3.337	3.337	0	
Load (50%)	3.323	3.323	3.323	3.323	3.323	3.323	0	
Load (100%)	3.307	3.307	3.307	3.307	3.307	3.307	0	
Load Regulation (mV)	30	30	30	30	30	30		

입력	출력	측정값	파형	비고
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Dynamic Load Response Characteristics (100Hz)

AC220V	$I_o=10 \leftrightarrow 100\%$ $f_s=100\text{Hz}$ Duty=50% Slew rate 50 μs	$+V_{PK} = 178\text{mV}$ (5.3%)* $-V_{PK} = 190\text{mV}$ (5.7%)*		CH4(전압) 200mV/div 5ms/div CH3(전류) 10A/div 5ms/div
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Dynamic Load Response Characteristics (1KHz)

AC220V	$I_o=0 \leftrightarrow 100\%$ $f_s=1\text{Kz}$ Duty=50% Slew rate 50 μs	$+V_{PK} = 161\text{mV}$ (4.8%)* $-V_{PK} = 150\text{mV}$ (4.5%)*		CH4(전압) 200mV/div 500us/div CH3(전류) 10A/div 500us/div
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Ripple & Noise Characteristics

AC220V	$I_o=100\%$ 20A	Ripple 4.95mV Ripple & Noise 19.2mV _{P-P}		CH4(전압) 5.00mV/div 20.0us/div
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1-2. JSF100-3R3 Output characteristics

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(3) Oscilloscope : WAVESURFER 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE – ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe

◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive probe (BANDWIDTH: 200MHz)

입력	출력	측정값	파형	비고
Turn on Time Characteristics				
AC110V	$I_o=100\%$ 20A	$T_{on} = 1698ms$		CH2: 100V/div CH1: 1.00V/div 200ms/div
Hold up Time Characteristics				
AC110V	$I_o=100\%$ 20A	$T_{off} = 23ms$		CH2: 100V/div CH1: 1.00V/div 20.0ms/div
Over Current protection characteristics				
220VAC	$I_o=100\%$	OCP= 25.3A (126%)		CH4(전압) 1.00V/div 50ms/div CH3(전류) 5.00A/div 50ms/div
Over Voltage protection characteristics				
AC220V	$I_o=10\%$	OVP = 4.36[V] (132%)		CH4(전압) 1.00V/div 500ms/div

2-1. JSF100-05 Input Characteristics

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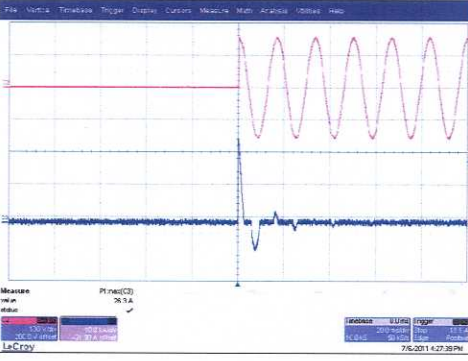
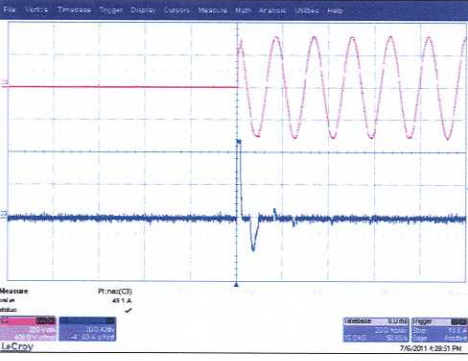
(1) Oscilloscope: WavePro 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : INPUT CURRENT - AP015 Current probe (BANDWIDTH: 200MHz)

(2) Power Analyzer: 3332 (HIOKI)

(3) Leakage Current Tester: 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고			
Inrush Current Characteristics (110V)							
AC110V	$I_o=100\%$ (16A)	Inrush = 26.3 [A]		CH2(전압) 200V/div 20ms/div CH3(전류) 10A/div 20ms/div			
Inrush Current Characteristics (220V)							
AC220V	$I_o=100\%$ (16A)	Inrush = 49.1 [A]		CH2(전압) 200V/div 20ms/div CH3(전류) 20A/div 20ms/div			
Input Current & Efficiency Characteristics Condition Ta : 25°C							
$I_o \backslash V_{in}$		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current (A)	0.042	0.042	0.045	0.053	0.061	0.07
	Efficiency (%)	-	-	-	-	-	-
Load (50%) 13A	Input Current (A)	1.07	0.89	0.78	0.63	0.55	0.49
	Efficiency (%)	79.7	80.3	80.3	80.2	79.2	77.3
Load (100%) 26A	Input Current (A)	2.05	1.73	1.48	1.17	1.01	0.89
	Efficiency (%)	76.1	77.8	78.8	79.4	79.4	78.8
Leakage Current Characteristics Condition Ta : 25°C							
$I_o \backslash V_{in}$		88V	110V	220V	264V	-	-
Line L (mA)		0.32	0.39	0.62	0.7	-	-
Line N (mA)		0.32	0.39	0.61	0.71	-	-

2-2. JSF100-05 Output Characteristics

< 계측기 >

(1) Oscilloscope: WAVESURFER 454 (LeCroy)

◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive Voltage probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe (BANDWIDTH: 200MHz)

◇ CH4 : BNC Cable 1.5m, 50Ω (BANDWIDTH: 200MHz)

(2) Digital Multi Meter: 2000 (KEITHLEY)

Line & Load Regulation Characteristics							Condition Ta : 25°C	
I_o \ V_{in}	88V	110V	132V	170V	220V	264V	Line Regulation (mV)	
Load (0A)	5.052	5.052	5.052	5.052	5.052	5.052	0	
Load (50%)	5.053	5.053	5.053	5.053	5.053	5.053	0	
Load (100%)	5.054	5.054	5.054	5.054	5.054	5.054	0	
Load Regulation (mV)	2	2	2	2	2	2		

입력	출력	측정값	파형	비고
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Dynamic Load Response Characteristics (100Hz)

AC220V	$I_o=10 \leftrightarrow 100\%$ $f_s=100\text{Hz}$ Duty=50% Slew rate 50uS	+VPK = 104mV (2.1%) -VPK = 131mV (2.6%)		CH4(전압) 100mV/div 5ms/div CH3(전류) 10A/div 5ms/div
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Dynamic Load Response Characteristics (1KHz)

AC220V	$I_o=0 \leftrightarrow 100\%$ $f_s=1\text{Kz}$ Duty=50% Slew rate 50uS	+VPK = 122mV (2.4%) -VPK = 127mV (2.5%)		CH4(전압) 100mV/div 500us/div CH3(전류) 10A/div 500us/div
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Ripple & Noise Characteristics

AC220V	$I_o=100\%$ 16A	Ripple 7.2mV Ripple & Noise 26.6mV _{P-P}		CH4(전압) 10.0mV/div 20.0us/div
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2-2. JSF100-05 Output characteristics

< 계측기 >

(3) Oscilloscope : WAVESURFER 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE – ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe

◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive probe (BANDWIDTH: 200MHz)

입력	출력	측정값	파형	비고
Turn on Time Characteristics				
AC110V	$I_o=100\%$ 16A	$T_{on} = 1703ms$		CH2: 100V/div CH1: 2.00V/div 500ms/div
Hold up Time Characteristics				
AC110V	$I_o=100\%$ 16A	$T_{off} = 23.08ms$		CH2: 100V/div CH1: 2.00V/div 20.0ms/div
Over Current protection characteristics				
220VAC	$I_o=100\%$	OCP= 21.3A (133%)		CH4(전압) 1.00V/div 50ms/div CH3(전류) 5.00A/div 50ms/div
Over Voltage protection characteristics				
AC220V	$I_o=10\%$	OVP = 6.7[V] (134%)		CH4(전압) 2.00V/div 100ms/div

3-1. JSF100-09 Input Characteristics

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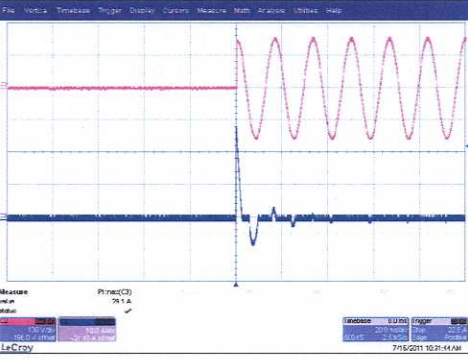
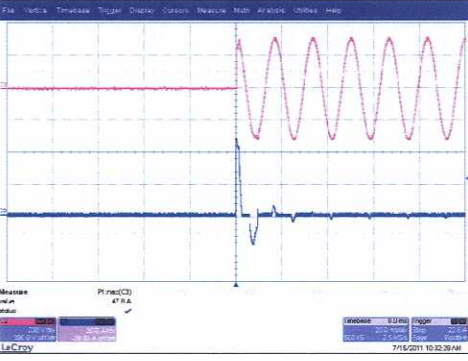
(1) Oscilloscope: WavePro 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : INPUT CURRENT - AP015 Current probe (BANDWIDTH: 200MHz)

(2) Power Analyzer: 3332 (HIOKI)

(3) Leakage Current Tester: 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고			
Inrush Current Characteristics (110V)							
AC110V	$I_o=100\%$ (11A)	$I_{rush} = 29.1 [A]$		CH2(전압) 100V/div 20ms/div CH3(전류) 10A/div 20ms/div			
Inrush Current Characteristics (220V)							
AC220V	$I_o=100\%$ (11A)	$I_{rush} = 47.8 [A]$		CH2(전압) 200V/div 20ms/div CH3(전류) 20A/div 20ms/div			
Input Current & Efficiency Characteristics Condition $T_a : 25^\circ C$							
V_{in}		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current (A)	0.053	0.051	0.052	0.056	0.061	0.067
	Efficiency (%)	-	-	-	-	-	-
Load (50%) 8.25A	Input Current (A)	1.22	1.02	0.89	0.71	0.63	0.55
	Efficiency (%)	81.9	82.6	82.8	83.1	82.2	81.7
Load (100%) 16.5A	Input Current (A)	2.45	2.05	1.79	1.44	1.25	1.09
	Efficiency (%)	79.6	81.7	82.7	83.6	83.6	83.2
Leakage Current Characteristics Condition $T_a : 25^\circ C$							
V_{in}		88V	110V	220V	264V	-	-
Line L (mA)		0.35	0.4	0.62	0.69	-	-
Line N (mA)		0.33	0.36	0.62	0.69	-	-

3-2. JSF100-09 Output Characteristics

< 계측기 >

(1) Oscilloscope: WAVESURFER 454 (LeCroy)

◇ CH1, CH4 : OUTPUT VOLTAGE – PP005-WS Passive Voltage probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe (BANDWIDTH: 200MHz)

◇ CH4 : BNC Cable 1.5m, 50Ω (BANDWIDTH: 200MHz)

(2) Digital Multi Meter: 2000 (KEITHLEY)

Line & Load Regulation Characteristics							Condition Ta : 25°C	
I_o \ V_{in}	88V	110V	132V	170V	220V	264V	Line Regulation (mV)	
Load (0A)	9.017	9.017	9.017	9.017	9.016	9.016	1	
Load (50%)	9.008	9.008	9.008	9.008	9.007	9.007	1	
Load (100%)	8.999	8.999	8.999	8.999	8.998	8.998	1	
Load Regulation (mV)	18	18	18	18	18	18		

입력	출력	측정값	파형	비고
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Dynamic Load Response Characteristics (100Hz)

AC220V	$I_o=10 \leftrightarrow 100\%$ $f_s=100\text{Hz}$ Duty=50% Slew rate 50uS	+VPK = 103mV (1.1%) -VPK = 112mV (1.2%)		CH4(전압) 100mV/div 5ms/div CH3(전류) 5A/div 5ms/div
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Dynamic Load Response Characteristics (1KHz)

AC220V	$I_o=0 \leftrightarrow 100\%$ $f_s=1\text{Kz}$ Duty=50% Slew rate 50uS	+VPK = 112mV (1.2%) -VPK = 118mV (1.3%)		CH4(전압) 100mV/div 500us/div CH3(전류) 5A/div 500us/div
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Ripple & Noise Characteristics

AC220V	$I_o=100\%$ 11A	Ripple 17.0mV Ripple & Noise 23.4mV _{P-P}		CH4(전압) 50.0mV/div 20.0us/div
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3-2. JSF100-09 Output characteristics

< 계측기 >

(3) Oscilloscope : WAVESURFER 454 (LeCroy)

- ◇ CH2 : INPUT VOLTAGE – ADP305 High voltage differential probe (BANDWIDTH: 200MHz)
- ◇ CH3 : OUTPUT CURRENT – AP015 Current probe
- ◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive probe (BANDWIDTH: 200MHz)

입력	출력	측정값	파형	비고
Turn on Time Characteristics				
AC110V	$I_o=100\%$ 11A	$T_{on} = 1743\text{ms}$		CH2: 100V/div CH1: 5.00V/div 500ms/div
Hold up Time Characteristics				
AC110V	$I_o=100\%$ 11A	$T_{off} = 24.0\text{ms}$		CH2: 100V/div CH1: 5.00V/div 20.0ms/div
Over Current protection characteristics				
220VAC	$I_o=100\%$	OCP= 13.8A (125%)		CH4(전압) 2.00V/div 20ms/div CH3(전류) 2.00A/div 20ms/div
Over Voltage protection characteristics				
AC220V	$I_o=10\%$	OVP = 11.2[V] (124%)		CH4(전압) 2.00V/div 100ms/div

4-1. JSF100-12 Input Characteristics

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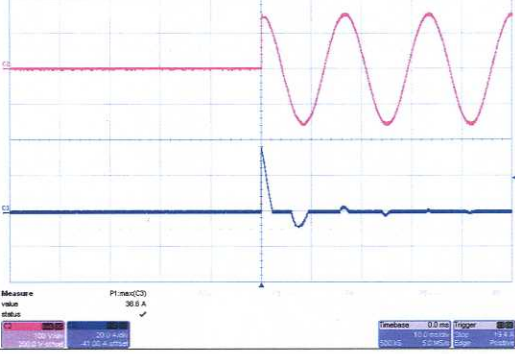
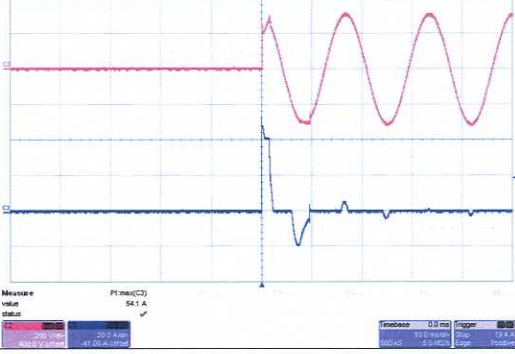
(1) Oscilloscope: WavePro 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : INPUT CURRENT - AP015 Current probe (BANDWIDTH: 200MHz)

(2) Power Analyzer: 3332 (HIOKI)

(3) Leakage Current Tester: 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고			
Inrush Current Characteristics (110V)							
AC110V	$I_o=100\%$ (8.5A)	Inrush = 36.6 [A]		CH2(전압) 100V/div 10ms/div CH3(전류) 20A/div 10ms/div			
Inrush Current Characteristics (220V)							
AC220V	$I_o=100\%$ (8.5A)	Inrush = 54.1 [A]		CH2(전압) 200V/div 10ms/div CH3(전류) 20A/div 10ms/div			
Input Current & Efficiency Characteristics Condition Ta : 25°C							
I_o \ V_{in}		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current (A)	0.056	0.053	0.051	0.053	0.059	0.062
	Efficiency (%)	-	-	-	-	-	-
Load (50%) 6.25A	Input Current (A)	1.23	1.04	0.90	0.73	0.63	0.58
	Efficiency (%)	83.1	84.1	84.3	84.3	84.1	82.7
Load (100%) 12.5A	Input Current (A)	2.4	2.03	1.76	1.47	1.2	1.05
	Efficiency (%)	81.3	83.3	84.4	85.1	85.3	84.8
Leakage Current Characteristics Condition Ta : 25°C							
I_o \ V_{in}		88V	110V	220V	264V	-	-
Line L (mA)		0.3	0.35	0.6	0.69	-	-
Line N (mA)		0.3	0.35	0.58	0.7	-	-

4-2. JSF100-12 Output Characteristics

< 계측기 >

(2) Oscilloscope: WAVESURFER 454 (LeCroy)

◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive Voltage probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe (BANDWIDTH: 200MHz)

◇ CH4 : BNC Cable 1.5m, 50Ω (BANDWIDTH: 200MHz)

(2) Digital Multi Meter: 2000 (KEITHLEY)

Line & Load Regulation Characteristics							Condition Ta : 25°C	
I_o \ V_{in}	88V	110V	132V	170V	220V	264V	Line Regulation (mV)	
Load (0A)	12.044	12.044	12.044	12.044	12.043	12.043	1	
Load (50%)	12.036	12.036	12.036	12.036	12.036	12.036	0	
Load (100%)	12.029	12.029	12.029	12.029	12.029	12.029	0	
Load Regulation (mV)	15	15	15	15	14	14		

입력	출력	측정값	파형	비고
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Dynamic Load Response Characteristics (100Hz)

AC220V	$I_o=10 \leftrightarrow 100\%$ $f_s=100\text{Hz}$ Duty=50% Slew rate 50 μS	$+V_{PK} = 148\text{mV}$ (1.2%) $-V_{PK} = 169\text{mV}$ (1.5%)		CH4(전압) 200mV/div 5ms/div CH3(전류) 5A/div 5ms/div
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Dynamic Load Response Characteristics (1KHz)

AC220V	$I_o=0 \leftrightarrow 100\%$ $f_s=1\text{Kz}$ Duty=50% Slew rate 50 μS	$+V_{PK} = 153\text{mV}$ (1.3%) $-V_{PK} = 160\text{mV}$ (1.3%)		CH4(전압) 200mV/div 500us/div CH3(전류) 5A/div 500us/div
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Ripple & Noise Characteristics

AC220V	$I_o=100\%$ 8.5A	Ripple 7.4mV Ripple & Noise 70.6mV _{P-P}		CH4(전압) 20.0mV/div 20.0us/div
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4-2. JSF100-12 Output characteristics

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(3) Oscilloscope : WAVESURFER 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT - AP015 Current probe

◇ CH1,CH4 : OUTPUT VOLTAGE - PP005-WS Passive probe (BANDWIDTH: 200MHz)

입력	출력	측정값	파형	비고
Turn on Time Characteristics				
AC110V	$I_o=100\%$ 8.5A	$T_{on} = 1706\text{ms}$		CH2: 100V/div CH1: 5.00V/div 500ms/div
Hold up Time Characteristics				
AC110V	$I_o=100\%$ 8.5A	$T_{off} = 23.1\text{ms}$		CH2: 100V/div CH1: 5.00V/div 20.0ms/div
Over Current protection characteristics				
220VAC	$I_o=100\%$	OCP= 11.3A (132%)		CH4(전압) 2.00V/div 20ms/div CH3(전류) 2.00A/div 20ms/div
Over Voltage protection characteristics				
AC220V	$I_o=10\%$	OVP = 15.6[V] (130%)		CH4(전압) 5.00V/div 100ms/div

5-1. JSF100-15 Input Characteristics

< 측정기 >

(1) Oscilloscope: WavePro 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : INPUT CURRENT - AP015 Current probe (BANDWIDTH: 200MHz)

(2) Power Analyzer: 3332 (HIOKI)

(3) Leakage Current Tester: 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고
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Inrush Current Characteristics (110V)

AC110V	$I_o=100\%$ (7A)	Inrush = 36.3 [A]		CH2(전압) 100V/div 10ms/div CH3(전류) 20A/div 10ms/div
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Inrush Current Characteristics (220V)

AC220V	$I_o=100\%$ (7A)	Inrush = 51.3 [A]		CH2(전압) 200V/div 10ms/div CH3(전류) 20A/div 10ms/div
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Input Current & Efficiency Characteristics

Condition Ta : 25°C

I_o \ Vin		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current (A)	0.059	0.057	0.057	0.06	0.066	0.072
	Efficiency (%)	-	-	-	-	-	-
Load (50%) 5A	Input Current (A)	1.24	1.05	0.91	0.72	0.63	0.56
	Efficiency (%)	83.3	84.2	84.4	84.3	84.2	83.3
Load (100%) 10A	Input Current (A)	2.5	2.1	1.82	1.5	1.24	1.08
	Efficiency (%)	81.8	83.9	85	85.8	85.9	85.6

Leakage Current Characteristics

Condition Ta : 25°C

I_o \ Vin		88V	110V	220V	264V	-	-
Line L	(mA)	0.3	0.37	0.6	0.7	-	-
Line N	(mA)	0.31	0.36	0.63	0.7	-	-

5-2. JSF100-15 Output Characteristics

< 계측기 >

(1) Oscilloscope: WAVESURFER 454 (LeCroy)

◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive Voltage probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe (BANDWIDTH: 200MHz)

◇ CH4 : BNC Cable 1.5m, 50Ω (BANDWIDTH: 200MHz)

(2) Digital Multi Meter: 2000 (KEITHLEY)

Line & Load Regulation Characteristics							Condition Ta : 25°C	
I_o \ V_{in}	88V	110V	132V	170V	220V	264V	Line Regulation (mV)	
Load (0A)	15.078	15.078	15.078	15.078	15.077	15.077	1	
Load (50%)	15.072	15.072	15.072	15.072	15.072	15.072	0	
Load (100%)	15.067	15.067	15.067	15.067	15.067	15.067	0	
Load Regulation (mV)	11	11	11	11	10	10		

입력	출력	측정값	파형	비고
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Dynamic Load Response Characteristics (100Hz)

AC220V	$I_o=10 \leftrightarrow 100\%$ $f_s=100\text{Hz}$ Duty=50% Slew rate 50uS	+VPK = 158mV (1.1%) -VPK = 172mV (1.2%)		CH4(전압) 200mV/div 5ms/div CH3(전류) 5A/div 5ms/div
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Dynamic Load Response Characteristics (1KHz)

AC220V	$I_o=0 \leftrightarrow 100\%$ $f_s=1\text{Kz}$ Duty=50% Slew rate 50uS	+VPK = 154mV (1.0%) -VPK = 174mV (1.2%)		CH4(전압) 200mV/div 500us/div CH3(전류) 5A/div 500us/div
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Ripple & Noise Characteristics

AC220V	$I_o=100\%$ 7A	Ripple 8.0mV Ripple & Noise 68.1mV _{P-P}		CH4(전압) 20.0mV/div 20.0us/div
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5-2. JSF100-15 Output characteristics

< 계측기 >

(3) Oscilloscope : WAVESURFER 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT - AP015 Current probe

◇ CH1,CH4 : OUTPUT VOLTAGE - PP005-WS Passive probe (BANDWIDTH: 200MHz)

입력	출력	측정값	파형	비고
Turn on Time Characteristics				
AC110V	$I_o=100\%$ 7A	$T_{on} = 1705ms$		CH2: 200V/div CH1: 5.00V/div 500ms/div
Hold up Time Characteristics				
AC110V	$I_o=100\%$ 7A	$T_{off} = 25.5ms$		CH2: 100V/div CH1: 5.00V/div 20.0ms/div
Over Current protection characteristics				
220VAC	$I_o=100\%$	OCP= 9.1A (130%)		CH4(전압) 2.00V/div 10ms/div CH3(전류) 2.00A/div 10ms/div
Over Voltage protection characteristics				
AC220V	$I_o=10\%$	OVP = 19.3[V] (128%)		CH4(전압) 5.00V/div 100ms/div

6-1. JSF100-24 Input Characteristics

< 측정기 >

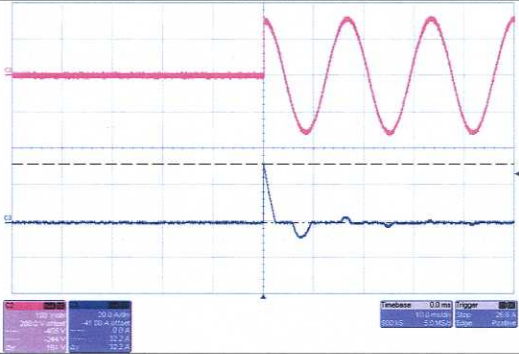
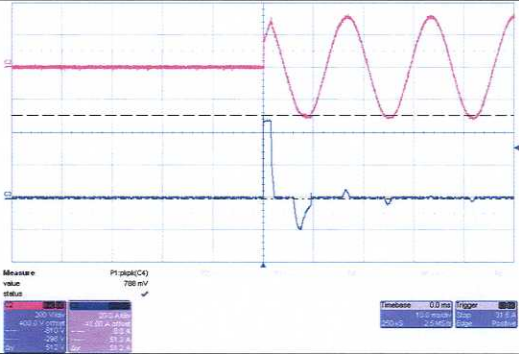
(1) Oscilloscope: WavePro 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : INPUT CURRENT - AP015 Current probe (BANDWIDTH: 200MHz)

(2) Power Analyzer: 3332 (HIOKI)

(3) Leakage Current Tester: 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고				
Inrush Current Characteristics (110V)								
AC110V	$I_o=100\%$ (4.5A)	$I_{rush} = 32.5 [A]$		CH2(전압) 100V/div 10ms/div CH3(전류) 20A/div 10ms/div				
Inrush Current Characteristics (220V)								
AC220V	$I_o=100\%$ (4.5A)	$I_{rush} = 50.5 [A]$		CH2(전압) 200V/div 10ms/div CH3(전류) 20A/div 10ms/div				
Input Current & Efficiency Characteristics Condition $T_a : 25^\circ C$								
V_{in}		88V	110V	132V	170V	220V	264V	
I_o	Load (min) 0A	Input Current (A)	0.075	0.07	0.068	0.07	0.075	0.08
		Efficiency (%)	-	-	-	-	-	-
Load (50%) 3.25A		Input Current (A)	1.27	1.07	0.93	0.74	0.66	0.59
		Efficiency (%)	83.7	84.5	84.9	85.3	84.3	82.8
Load (100%) 6.5A		Input Current (A)	2.52	2.13	1.83	1.47	1.27	1.11
		Efficiency (%)	82.6	84.7	85.6	86.4	86.4	85.8
Leakage Current Characteristics Condition $T_a : 25^\circ C$								
V_{in}		88V	110V	220V	264V	-	-	
I_o		Line L (mA)	0.32	0.39	0.6	0.7	-	-
		Line N (mA)	0.32	0.36	0.66	0.7	-	-

6-2. JSF100-24 Output Characteristics

< 계측기 >

(1) Oscilloscope: WAVESURFER 454 (LeCroy)

◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive Voltage probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe (BANDWIDTH: 200MHz)

◇ CH4 : BNC Cable 1.5m, 50Ω (BANDWIDTH: 200MHz)

(2) Digital Multi Meter: 2000 (KEITHLEY)

Line & Load Regulation Characteristics							Condition	Ta : 25°C
I_o \ V_{in}	88V	110V	132V	170V	220V	264V	Line Regulation (mV)	
Load (0A)	24.040	24.040	24.040	24.041	24.042	24.042	2	
Load (50%)	24.031	24.033	24.035	24.036	24.037	24.038	7	
Load (100%)	24.023	24.022	24.021	24.023	24.024	24.026	5	
Load Regulation (mV)	17	18	19	18	18	16		

입력	출력	측정값	파형	비고
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Dynamic Load Response Characteristics (100Hz)

AC220V	$I_o=10 \leftrightarrow 100\%$ $f_s=100\text{Hz}$ Duty=50% Slew rate 50 μs	$+V_{PK} = 141\text{mV}$ (0.59%) $-V_{PK} = 198\text{mV}$ (0.82%)		CH4(전압) 200mV/div 5ms/div CH3(전류) 2A/div 5ms/div
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Dynamic Load Response Characteristics (1KHz)

AC220V	$I_o=0 \leftrightarrow 100\%$ $f_s=1\text{Kz}$ Duty=50% Slew rate 50 μs	$+V_{PK} = 130\text{mV}$ (0.54%) $-V_{PK} = 162\text{mV}$ (0.68%)		CH4(전압) 200mV/div 500us/div CH3(전류) 2A/div 500us/div
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Ripple & Noise Characteristics

AC220V	$I_o=100\%$ 4.5A	Ripple 6.0mV Ripple & Noise 23.4mV _{P-P}		CH4(전압) 10.0mV/div 20.0us/div
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6-2. JSF100-24 Output characteristics

< 계측기 >

(3) Oscilloscope : WAVESURFER 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE – ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe

◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive probe (BANDWIDTH: 200MHz)

입력	출력	측정값	파형	비고
Turn on Time Characteristics				
AC110V	$I_o=100\%$ 4.5A	$T_{on} = 1715ms$		CH2: 100V/div CH1: 10.0V/div 500ms/div
Hold up Time Characteristics				
AC110V	$I_o=100\%$ 4.5A	$T_{off} = 22.5ms$		CH2: 100V/div CH1: 10.0V/div 20.0ms/div
Over Current protection characteristics				
220VAC	$I_o=100\%$	OCP= 4.42A (138%)		CH4(전압) 5.00V/div 500ms/div CH3(전류) 1.00A/div 500ms/div
Over Voltage protection characteristics				
AC220V	$I_o=10\%$	OVP = 30.1[V] (125%)		CH4(전압) 5.00V/div 100ms/div

7-1. JSF100-48 Input Characteristics

< 측정기 >

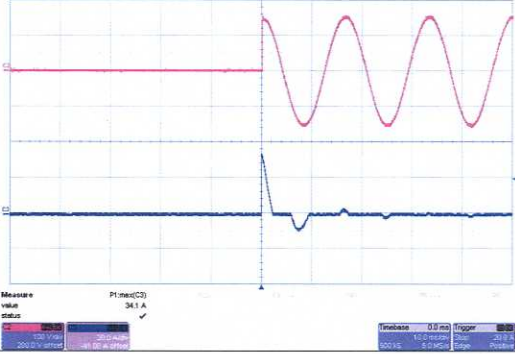
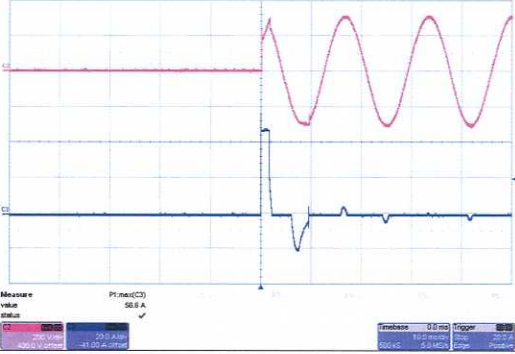
(1) Oscilloscope: WavePro 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : INPUT CURRENT - AP015 Current probe (BANDWIDTH: 200MHz)

(2) Power Analyzer: 3332 (HIOKI)

(3) Leakage Current Tester: 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고			
Inrush Current Characteristics (110V)							
AC110V	$I_o=100\%$ (2.3A)	Inrush = 34.1 [A]		CH2(전압) 100V/div 10ms/div CH3(전류) 20A/div 10ms/div			
Inrush Current Characteristics (220V)							
AC220V	$I_o=100\%$ (2.3A)	Inrush = 56.6 [A]		CH2(전압) 200V/div 10ms/div CH3(전류) 20A/div 10ms/div			
Input Current & Efficiency Characteristics Condition Ta : 25°C							
$I_o \backslash Vin$		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current (A)	0.069	0.064	0.06	0.061	0.065	0.071
	Efficiency (%)	-	-	-	-	-	-
Load (50%) 1.65	Input Current (A)	1.33	1.12	0.98	0.78	0.68	0.59
	Efficiency (%)	85.3	86.1	86.2	86.4	85	84.6
Load (100%) 3.3A	Input Current (A)	2.52	2.09	1.8	1.42	1.23	1.05
	Efficiency (%)	83.4	85.6	86.6	87.3	87.2	86.8
Leakage Current Characteristics Condition Ta : 25°C							
$I_o \backslash Vin$		88V	110V	220V	264V	-	-
Line L (mA)		0.33	0.38	0.61	0.71	-	-
Line N (mA)		0.33	0.35	0.65	0.71	-	-

7-2. JSF100-48 Output Characteristics

< 계측기 >

(1) Oscilloscope: WAVESURFER 454 (LeCroy)

◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive Voltage probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe (BANDWIDTH: 200MHz)

◇ CH4 : BNC Cable 1.5m, 50Ω (BANDWIDTH: 200MHz)

(2) Digital Multi Meter: 2000 (KEITHLEY)

Line & Load Regulation Characteristics							Condition	Ta : 25°C
V_{in} \ I_o	88V	110V	132V	170V	220V	264V	Line Regulation (mV)	
Load (0A)	48.076	48.076	48.076	48.074	48.073	48.073	3	
Load (50%)	48.068	48.069	48.069	48.069	48.069	48.068	1	
Load (100%)	48.067	48.067	48.063	48.063	48.063	48.063	4	
Load Regulation (mV)	9	9	13	11	10	10		

입력	출력	측정값	파형	비고
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Dynamic Load Response Characteristics (100Hz)

AC220V	$I_o=10 \leftrightarrow 100\%$ $f_s=100\text{Hz}$ Duty=50% Slew rate 50 μs	$+V_{PK} = 244\text{mV}$ (0.51%) $-V_{PK} = 350\text{mV}$ (0.73%)		CH4(전압) 200mV/div 5ms/div CH3(전류) 2A/div 5ms/div
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Dynamic Load Response Characteristics (1KHz)

AC220V	$I_o=0 \leftrightarrow 100\%$ $f_s=1\text{Kz}$ Duty=50% Slew rate 50 μs	$+V_{PK} = 150\text{mV}$ (0.31%) $-V_{PK} = 190\text{mV}$ (0.4%)		CH4(전압) 200mV/div 500us/div CH3(전류) 2A/div 500us/div
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Ripple & Noise Characteristics

AC220V	$I_o=100\%$ 2.3A	Ripple 3.6mV Ripple & Noise 20.5mV $_{P-P}$		CH4(전압) 5.00mV/div 20.0us/div
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7-2. JSF100-48 Output characteristics

< 계측기 >

(3) Oscilloscope : WAVESURFER 454 (LeCroy)

◇ CH2 : INPUT VOLTAGE – ADP305 High voltage differential probe (BANDWIDTH: 200MHz)

◇ CH3 : OUTPUT CURRENT – AP015 Current probe

◇ CH1,CH4 : OUTPUT VOLTAGE – PP005-WS Passive probe (BANDWIDTH: 200MHz)

입력	출력	측정값	파형	비고
Turn on Time Characteristics				
AC110V	$I_o=100\%$ 2.3A	$T_{on} = 1692ms$		CH2: 100V/div CH1: 20.0V/div 500ms/div
Hold up Time Characteristics				
AC110V	$I_o=100\%$ 2.3A	$T_{off} = 23.9ms$		CH2: 100V/div CH1: 20.0V/div 20.0ms/div
Over Current protection characteristics				
220VAC	$I_o=100\%$	OCP= 3.1A (134%)		CH4(전압) 10.0V/div 10ms/div CH3(전류) 1.00A/div 10ms/div
Over Voltage protection characteristics				
AC220V	$I_o=10\%$	OVP = 59.2[V] (123%)		CH4(전압) 10.0V/div 100ms/div