귀중

Evaluation Data

품 목	SMPS
품 명	JSF35-S
Rev. No.	A

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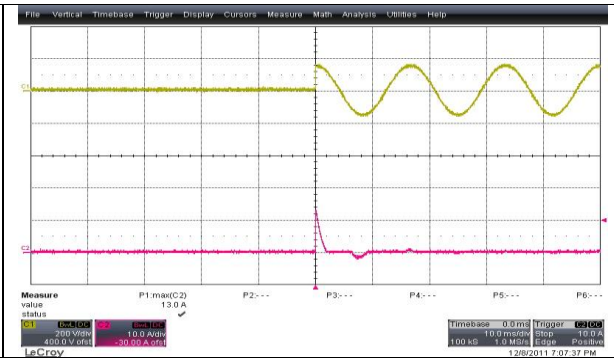
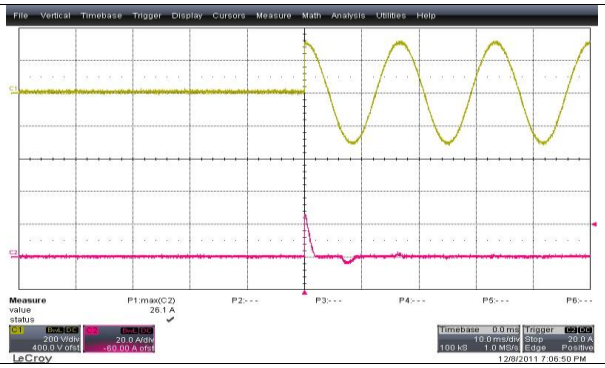
1-1. JSF35-3R3 Input characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
◇ CH1 : INPUT VOLTAGE - ADP305 High voltage differential probe
◇ CH2 : INPUT CURRENT - AP015 Current probe
(2) Power Analyzer : 3332 (HIOKI)
(3) Leakage Current Tester : 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고
Inrush Current Characteristics (110V)				
AC110V	I_O=100% (7A)	Irush = 13.0[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 10A/div 10ms/div
Inrush Current Characteristics (220V)				
AC220V	I_O=100% (7A)	Irush = 26.1[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 20A/div 10ms/div

Input Current & Efficiency Characteristics Condition Ta : 25℃

I_O \ Vin		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current	0.030A	0.032A	0.036A	0.043A	0.054A	0.064A
	Efficiency	-	-	-	-	-	-
Load (50%) 3.5A	Input Current	0.307A	0.260A	0.229A	0.195A	0.177A	0.161A
	Efficiency	73.56%	74.08%	74.03%	73.10%	70.00%	66.95%
Load (100%) 7.0A	Input Current	0.592A	0.497A	0.430A	0.363A	0.312A	0.271A
	Efficiency	72.52%	74.03%	74.63%	74.51%	73.45%	71.96%

Leakage Current Characteristics Condition Ta : 25℃

I_O \ Vin	88V	110V	132V	180V	220V	264V
Line L (mA)	0.18	0.23	0.26	0.39	0.48	0.56
Line N (mA)	0.19	0.24	0.28	0.39	0.47	0.55

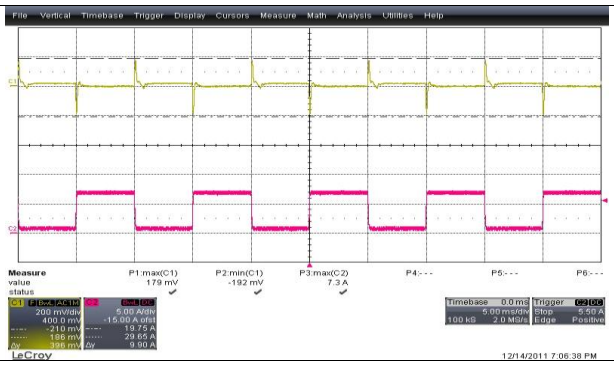
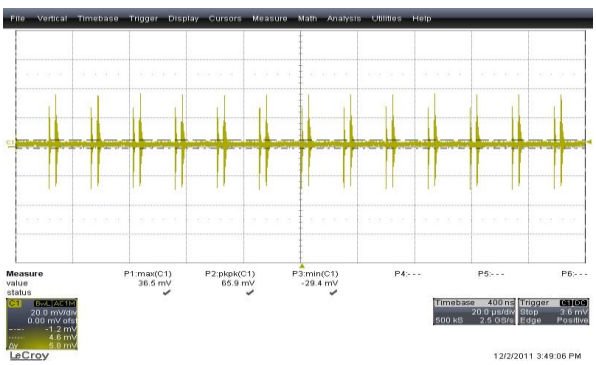
1-2. JSF35-3R3 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : INPUT VOLTAGE – PP005-WS Passive probe
- ◇ CH1 : BNC Cable 1.5m, 50Ω, BandWidth : 20Mhz
- ◇ CH2 : INPUT CURRENT - AP015 Current probe

(2) Digital Multi Meter : 2000 (KEITHLEY)

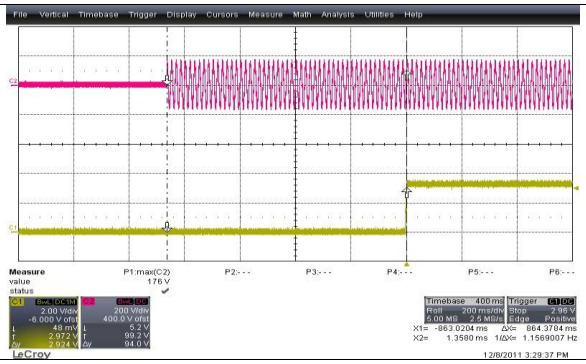
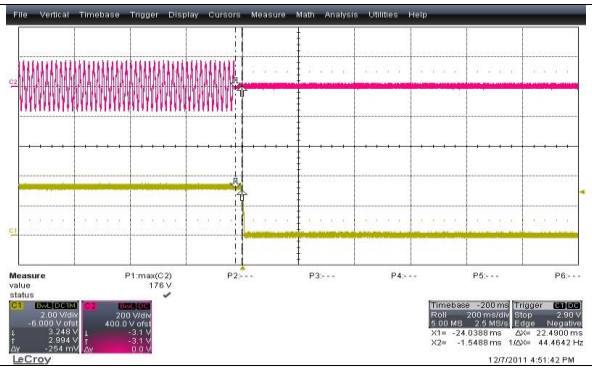
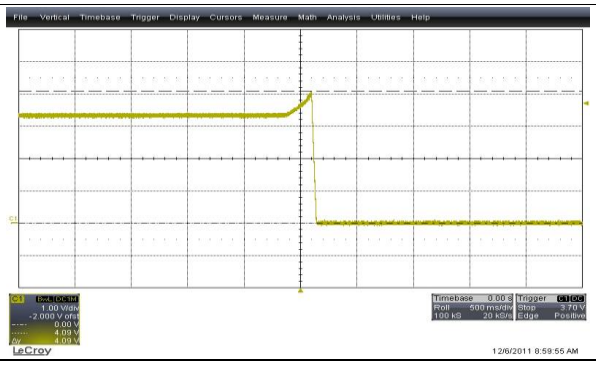
Line & Load Regulation Characteristics Condition Ta : 25℃

Vin / I_O	88V	110V	132V	170V	220V	264V	Line Regulation
Load (0A)	3.30	3.30	3.30	3.30	3.30	3.30	0mV
Load (50%)	3.29	3.29	3.29	3.29	3.29	3.29	0mV
Load (100%)	3.27	3.27	3.27	3.27	3.27	3.27	0mV
Load Regulation	30mV	30mV	30mV	30mV	30mV	30mV	

입력	출력	측정값	파형	비고
Dynamic Load Response Characteristics (100Hz)				
AC220V	I_O=0↔100% fs=100Hz Duty=50% Slew rate =100uS	+VPK = 179mV (3.58%) -VPK = 192mV (3.84%) *출력 5V기준 적용		CH1(전압) 200mV/div 5ms/div CH2(전류) 5A/div 5ms/div
Dynamic Load Response Characteristics (1KHz)				
AC220V	I_O=0↔100% fs=1KHz Duty=50% Slew rate =100uS	+VPK = 225mV (4.50%) -VPK = 226mV (4.52%) *출력 5V기준 적용		CH1(전압) 200mV/div 1ms/div CH2(전류) 5A/div 1ms/div
Ripple & Noise characteristics				
AC220V	I_O=100% 7A	Ripple 5.8mV Ripple & Noise 65.9mV$_{P-P}$		CH1(전압) 20mV/div 20us/div

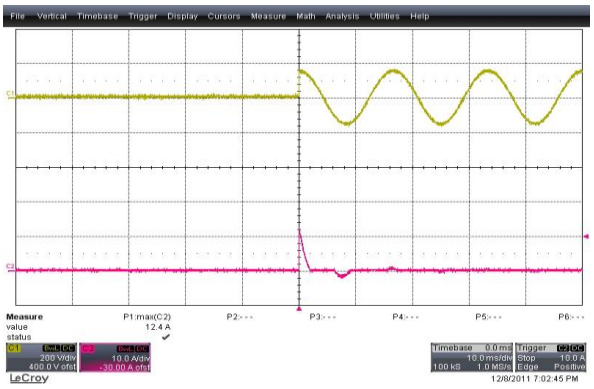
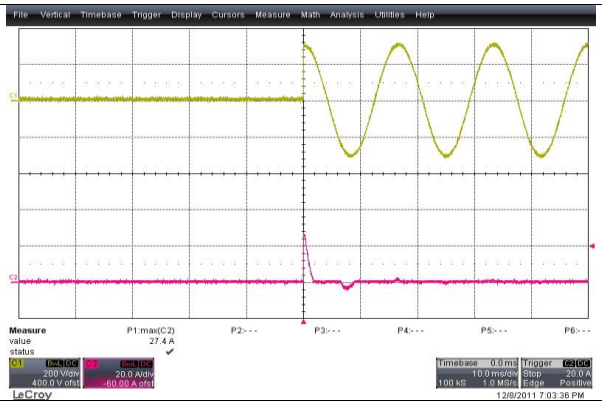
1-2. JSF35-3R3 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : OUTPUT VOLTAGE - PP005-WS Passive probe
- ◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe
- ◇ CH2 : OUTPUT VOLTAGE - AP015 Current probe

입력	출력	측정값	파형	비고
Turn on time characteristics				
AC110V	I_O=100% 7A	T_{on} = 864ms		CH1(전압) 2V/div 200ms/div CH2(전압) 200V/div 200ms/div
Hold up characteristics				
AC110V	I_O=100% 7A	T_{off} = 22ms		CH1(전압) 2V/div 200ms/div CH2(전압) 200V/div 200ms/div
Over Current protection characteristics				
AC220V	I_O=100% 7A	OCP = 9.7[A] (138%)		CH1(전압) 1.00V/div 2.00ms/div CH2(전류) 2.00A/div 2.00ms/div
Over Voltage protection characteristics				
AC220V	I_O=10% 0.7A	OVP = 4.09[V] (124%)		CH1(전압) 1.00V/div 500ms/div

2-1. JSF35-05 Input characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
◇ CH1 : INPUT VOLTAGE - ADP305 High voltage differential probe
◇ CH2 : INPUT CURRENT - AP015 Current probe
(2) Power Analyzer : 3332 (HIOKI)
(3) Leakage Current Tester : 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고
Inrush Current Characteristics (110V)				
AC110V	I_O=100% (7A)	Irush = 12.4[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 10A/div 10ms/div
Inrush Current Characteristics (220V)				
AC220V	I_O=100% (7A)	Irush = 27.4[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 20A/div 10ms/div

Input Current & Efficiency Characteristics Condition Ta : 25℃

Vin / I_O		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current	0.032A	0.034A	0.036A	0.043A	0.054A	0.063A
	Efficiency	-	-	-	-	-	-
Load (50%) 3.5A	Input Current	0.428A	0.369A	0.321A	0.270A	0.237A	0.208A
	Efficiency	76.41%	77.60%	77.60%	77.26%	75.10%	73.28%
Load (100%) 7.0A	Input Current	0.819A	0.692A	0.601A	0.505A	0.439A	0.373A
	Efficiency	75.92%	77.46%	78.19%	78.35%	77.77%	76.83%

Leakage Current Characteristics Condition Ta : 25℃

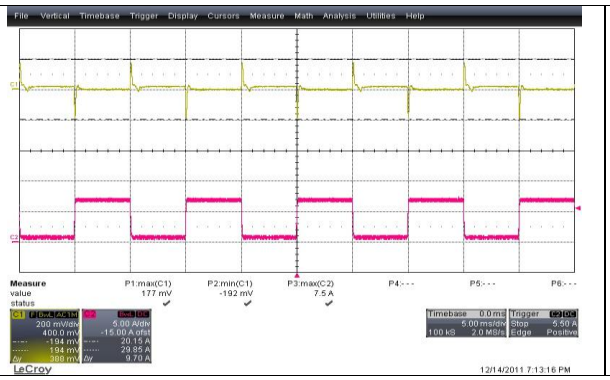
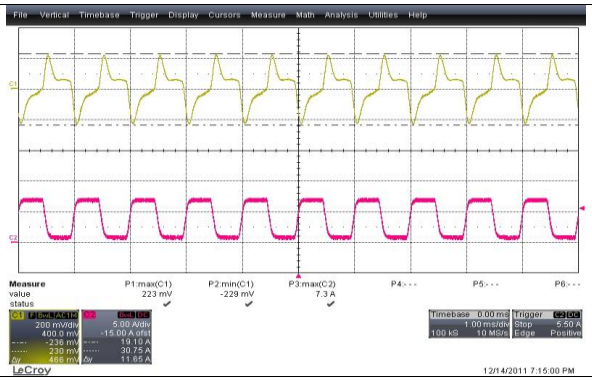
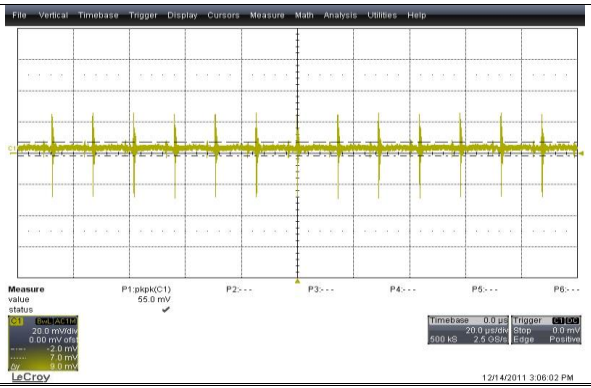
Vin / I_O	88V	110V	132V	180V	220V	264V
Line L(mA)	0.17	0.21	0.26	0.39	0.46	0.56
Line N(mA)	0.18	0.24	0.27	0.38	0.46	0.54

2-2. JSF35-05 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : INPUT VOLTAGE – PP005-WS Passive probe
- ◇ CH1 : BNC Cable 1.5m, 50Ω, Band Width : 20Mhz
- ◇ CH2 : INPUT CURRENT – AP015 Current probe

Line & Load Regulation Characteristics Condition Ta : 25℃

Vin / I_O	88V	110V	132V	170V	220V	264V	Line Regulation
Load (0A)	5.00	5.00	5.00	5.00	5.00	5.00	0mV
Load (50%)	5.00	5.00	5.00	5.00	5.00	5.00	0mV
Load (100%)	5.00	5.00	5.00	5.00	5.00	5.00	0mV
Load Regulation	0mV	0mV	0mV	0mV	0mV	0mV	

입력	출력	측정값	파형	비고
Dynamic Load Response Characteristics (100Hz)				
AC220V	I_O=0↔100% fs=100Hz Duty=50% Slew rate =100uS	+VPK = 177mV (3.54%) -VPK = 192mV (3.84%)		CH1(전압) 200mV/div 5ms/div CH2(전류) 5A/div 5ms/div
Dynamic Load Response Characteristics (1KHz)				
AC220V	I_O=0↔100% fs=1KHz Duty=50% Slew rate =100uS	+VPK = 223mV (4.46%) -VPK = 229mV (4.58%)		CH1(전압) 200mV/div 1ms/div CH2(전류) 5A/div 1ms/div
Ripple & Noise characteristics				
AC220V	I_O=100% 7A	Ripple 9.0mV Ripple & Noise 55.0mV$_{P-P}$		CH1(전압) 20mV/div 20us/div

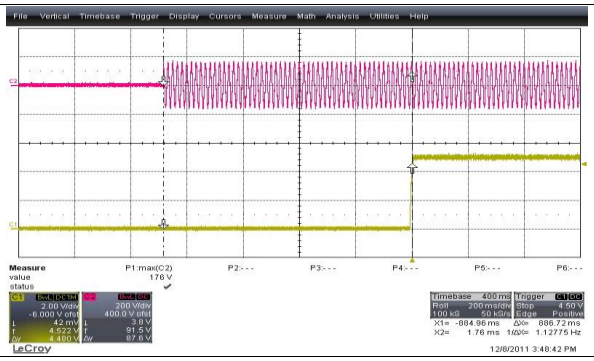
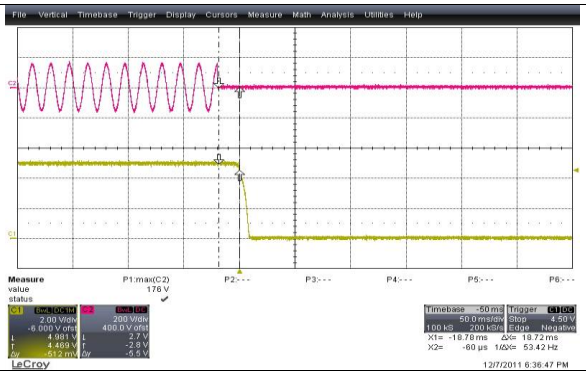
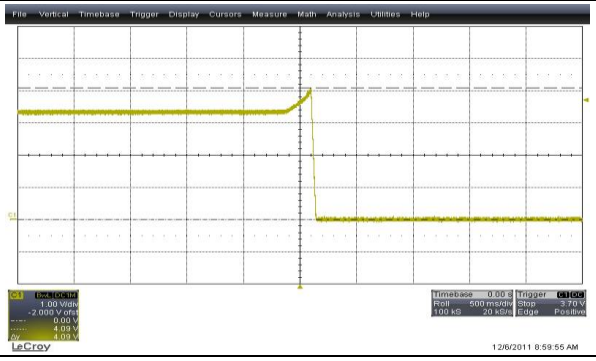
2-2. JSF35-05 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)

◇ CH1 : OUTPUT VOLTAGE - PP005-WS Passive probe

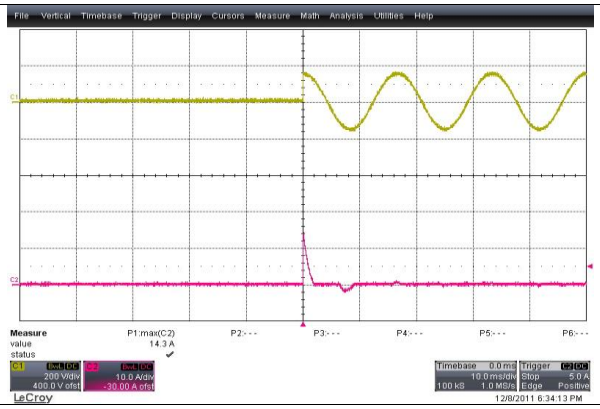
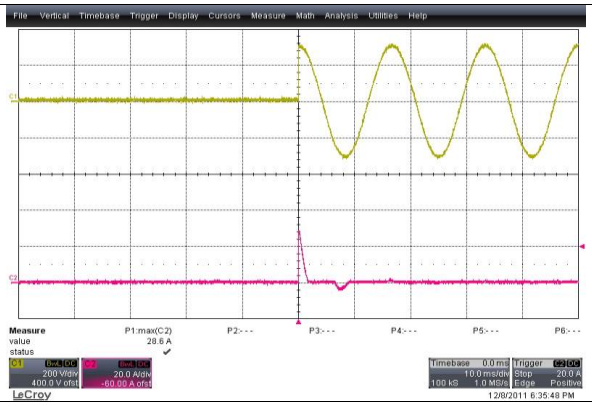
◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe

◇ CH2 : OUTPUT VOLTAGE - AP015 Current probe

입력	출력	측정값	파형	비고
Turn on time characteristics				
AC110V	I_O=100% 7A	T_{on} = 886ms		CH1(전압) 2V/div 200ms/div CH2(전압) 200V/div 200ms/div
Hold up characteristics				
AC110V	I_O=100% 7A	T_{off} = 18ms		CH1(전압) 2V/div 50ms/div CH2(전압) 200V/div 50ms/div
Over Current protection characteristics				
AC220V	I_O=100% 7A	OCP = 9.7[A] (138%)		CH1(전압) 1.00V/div 2.00ms/div CH2(전류) 2.00A/div 500us/div
Over Voltage protection characteristics				
AC220V	I_O=10% 0.7A	OVP = 4.09[V] (124%)		CH1(전압) 1.00V/div 500ms/div

3-1. JSF35-09 Input characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
◇ CH1 : INPUT VOLTAGE - ADP305 High voltage differential probe
◇ CH2 : INPUT CURRENT - AP015 Current probe
(2) Power Analyzer : 3332 (HIOKI)
(3) Leakage Current Tester : 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고
Inrush Current Characteristics (110V)				
AC110V	I_O=100% (4A)	Irush = 14.3[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 10A/div 10ms/div
Inrush Current Characteristics (220V)				
AC220V	I_O=100% (4A)	Irush = 28.6[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 20A/div 10ms/div

Input Current & Efficiency Characteristics Condition Ta : 25℃

I_O \ Vin		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current	0.036A	0.038A	0.040A	0.047A	0.057A	0.066A
	Efficiency	-	-	-	-	-	-
Load (50%) 2.0A	Input Current	0.428A	0.369A	0.323A	0.272A	0.238A	0.209A
	Efficiency	78.60%	79.70%	79.70%	79.36%	77.25%	75.63%
Load (100%) 4.0A	Input Current	0.810A	0.680A	0.594A	0.501A	0.436A	0.370A
	Efficiency	79.12%	80.89%	81.54%	81.54%	80.89%	79.82%

Leakage Current Characteristics Condition Ta : 25℃

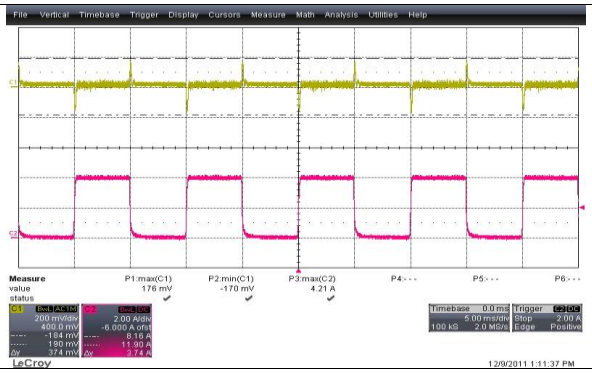
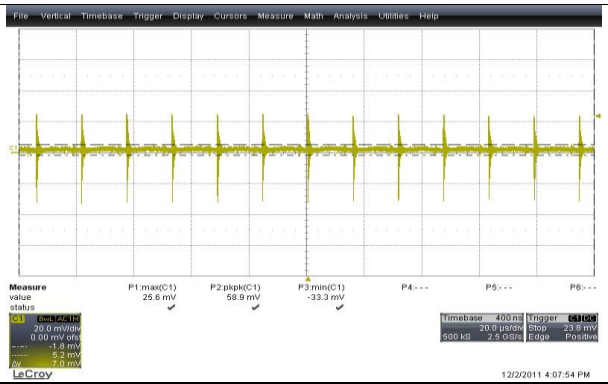
I_O \ Vin	88V	110V	132V	180V	220V	264V
Line L (mA)	0.15	0.20	0.24	0.36	0.45	0.55
Line N (mA)	0.18	0.21	0.26	0.36	0.45	0.53

3-2. JSF35-09 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : INPUT VOLTAGE – PP005-WS Passive probe
- ◇ CH1 : BNC Cable 1.5m, 50Ω, Band Width : 20Mhz
- ◇ CH2 : INPUT CURRENT – AP015 Current probe

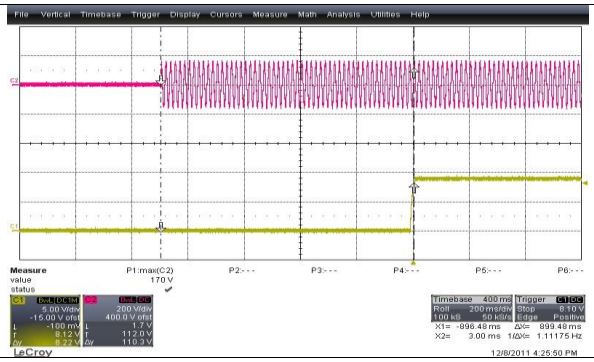
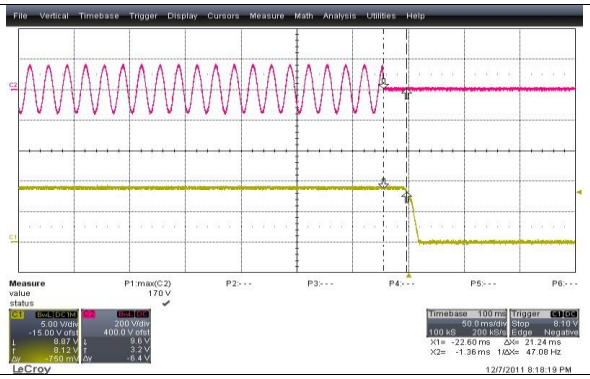
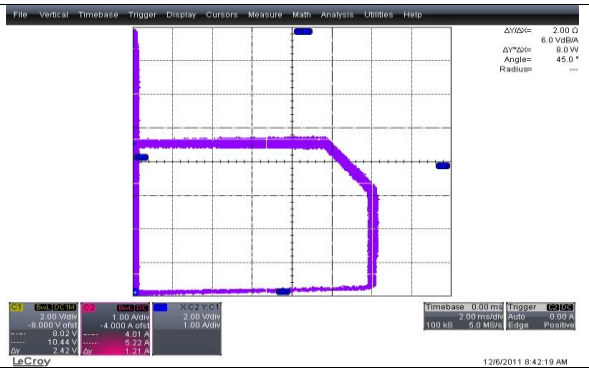
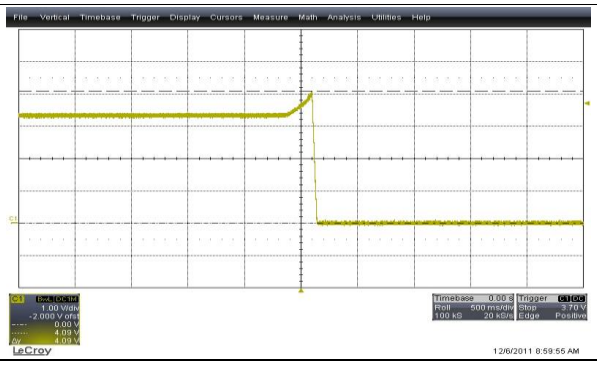
Line & Load Regulation Characteristics Condition Ta : 25℃

Vin / I_O	88V	110V	132V	170V	220V	264V	Line Regulation
Load (0A)	9.01	9.01	9.01	9.01	9.01	9.01	0mV
Load (50%)	9.00	9.00	9.00	9.00	9.00	9.01	10mV
Load (100%)	9.00	9.00	9.00	9.00	9.00	9.01	10mV
Load Regulation	10mV	10mV	10mV	10mV	10mV	0mV	

입력	출력	측정값	파형	비고
Dynamic Load Response Characteristics (100Hz)				
AC220V	I_O=0↔100% fs=100Hz Duty=50% Slew rate =100uS	+VPK = 176mV (1.96%) -VPK = 170mV (1.89%)		CH1(전압) 200mV/div 5ms/div CH2(전류) 2A/div 5ms/div
Dynamic Load Response Characteristics (1KHz)				
AC220V	I_O=0↔100% fs=1KHz Duty=50% Slew rate =100uS	+VPK = 234mV (2.60%) -VPK = 208mV (2.31%)		CH1(전압) 200mV/div 1ms/div CH2(전류) 2A/div 1ms/div
Ripple & Noise characteristics				
AC220V	I_O=100% 4A	Ripple 7.0mV Ripple & Noise 58.9mV$_{P-P}$		CH1(전압) 20mV/div 20us/div

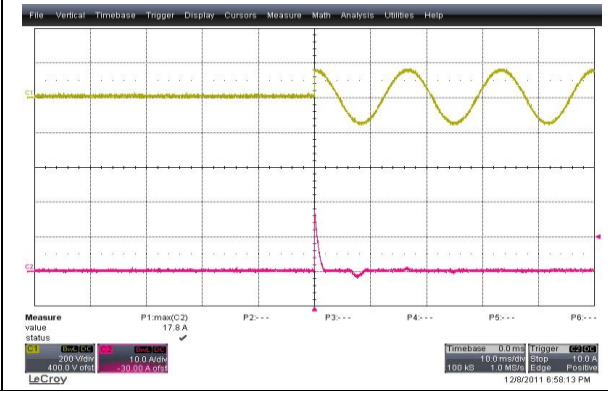
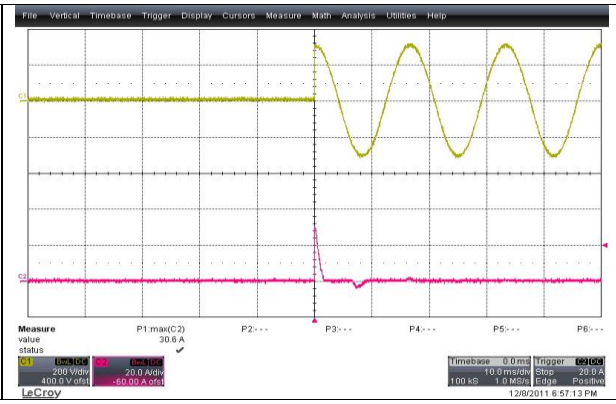
3-2. JSF35-09 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : OUTPUT VOLTAGE - PP005-WS Passive probe
- ◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe
- ◇ CH2 : OUTPUT VOLTAGE - AP015 Current probe

입력	출력	측정값	파형	비고
Turn on time characteristics				
AC110V	I_O=100% 4A	T_{on} = 899ms		CH1(전압) 5V/div 200ms/div CH2(전압) 200V/div 200ms/div
Hold up characteristics				
AC110V	I_O=100% 4A	T_{off} = 21ms		CH1(전압) 5V/div 50ms/div CH2(전압) 200V/div 50ms/div
Over Current protection characteristics				
AC220V	I_O=100% 4A	OCP = 5.25[A] (131%)		CH1(전압) 2.00V/div 2.00ms/div CH2(전류) 1.00A/div 2.00ms/div
Over Voltage protection characteristics				
AC220V	I_O=10% 0.4A	OVP = 4.09[V] (124%)		CH1(전압) 1.00V/div 500ms/div

4-1. JSF35-12 Input characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
◇ CH1 : INPUT VOLTAGE - ADP305 High voltage differential probe
◇ CH2 : INPUT CURRENT - AP015 Current probe
(2) Power Analyzer : 3332 (HIOKI)
(3) Leakage Current Tester : 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고
Inrush Current Characteristics (110V)				
AC110V	I_O=100% (3A)	Irush = 17.8[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 10A/div 10ms/div
Inrush Current Characteristics (220V)				
AC220V	I_O=100% (3A)	Irush = 30.6[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 20A/div 10ms/div

Input Current & Efficiency Characteristics Condition Ta : 25℃

I_O \ Vin		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current	0.040A	0.040A	0.042A	0.048A	0.060A	0.067A
	Efficiency	-	-	-	-	-	-
Load (50%) 1.5A	Input Current	0.433A	0.362A	0.316A	0.272A	0.242A	0.216A
	Efficiency	79.60%	80.14%	80.21%	79.01%	77.05%	74.38%
Load (100%) 3.0A	Input Current	0.794A	0.672A	0.579A	0.493A	0.430A	0.365A
	Efficiency	80.17%	81.63%	82.26%	82.15%	81.56%	80.17%

Leakage Current Characteristics Condition Ta : 25℃

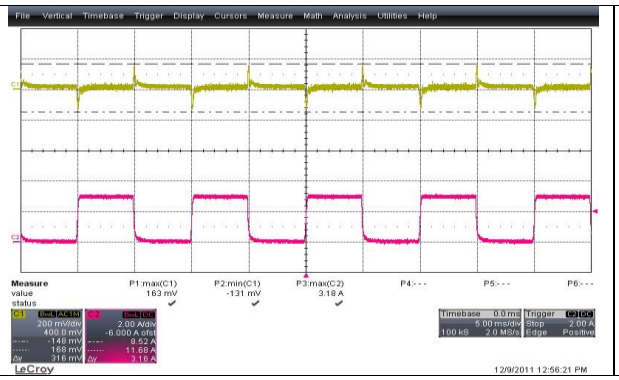
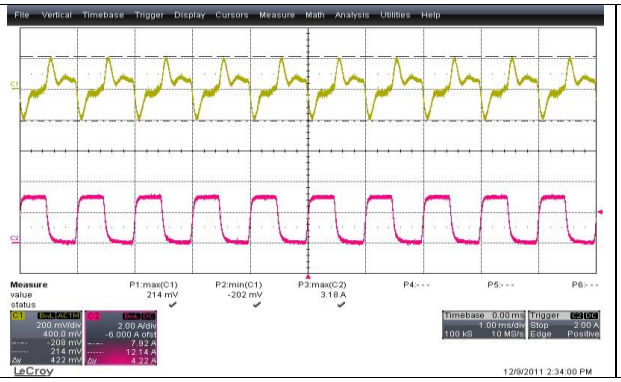
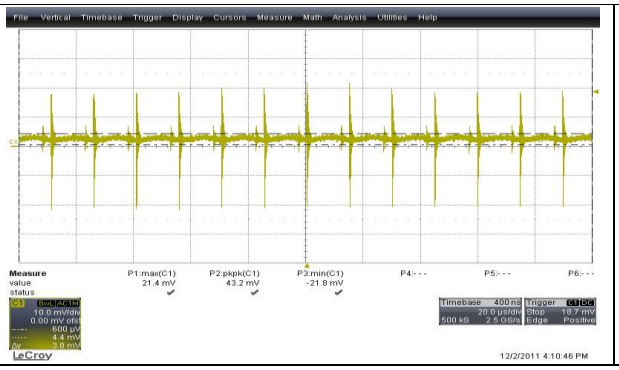
I_O \ Vin	88V	110V	132V	180V	220V	264V
Line L (mA)	0.17	0.21	0.25	0.41	0.39	0.55
Line N (mA)	0.20	0.24	0.28	0.39	0.40	0.55

4-2. JSF35-12 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : INPUT VOLTAGE – PP005-WS Passive probe
- ◇ CH1 : BNC Cable 1.5m, 50Ω, Band Width : 20Mhz
- ◇ CH2 : INPUT CURRENT - AP015 Current probe

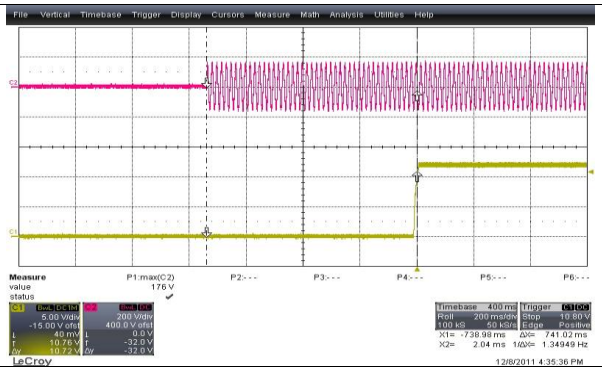
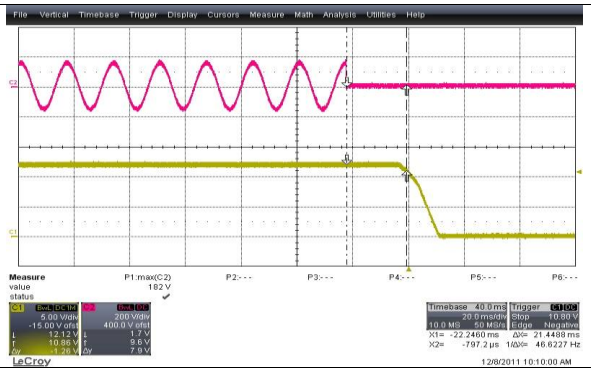
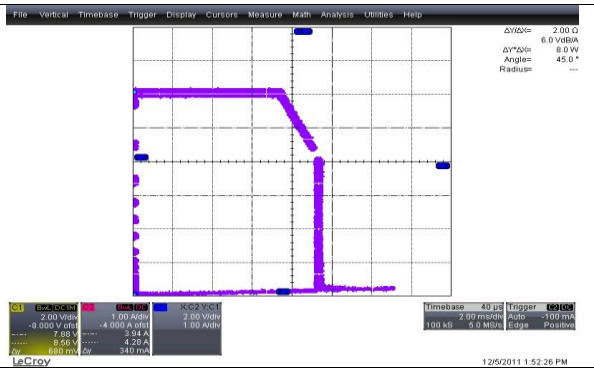
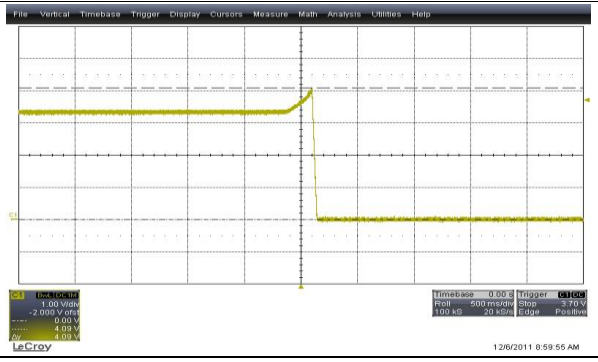
Line & Load Regulation Characteristics Condition Ta : 25℃

Vin / I_O	88V	110V	132V	170V	220V	264V	Line Regulation
Load (0A)	12.00	12.00	12.00	12.00	12.00	12.00	0mV
Load (50%)	12.00	12.00	12.00	12.00	12.00	12.00	0mV
Load (100%)	11.99	11.99	12.00	12.00	12.00	12.00	10mV
Load Regulation	10mV	10mV	0mV	0mV	0mV	0mV	

입력	출력	측정값	파형	비고
Dynamic Load Response Characteristics (100Hz)				
AC220V	I_O=0↔100% fs=100Hz Duty=50% Slew rate =100uS	+VPK = 163mV (1.36%) -VPK = 131mV (1.09%)		CH1(전압) 200mV/div 5ms/div CH2(전류) 2A/div 5ms/div
Dynamic Load Response Characteristics (1KHz)				
AC220V	I_O=0↔100% fs=1KHz Duty=50% Slew rate =100uS	+VPK = 214mV (1.78%) -VPK = 202mV (1.68%)		CH1(전압) 200mV/div 1ms/div CH2(전류) 2A/div 1ms/div
Ripple & Noise characteristics				
AC220V	I_O=100% 3A	Ripple 3.8mV Ripple & Noise 43.2mV$_{P-P}$		CH1(전압) 10mV/div 20us/div

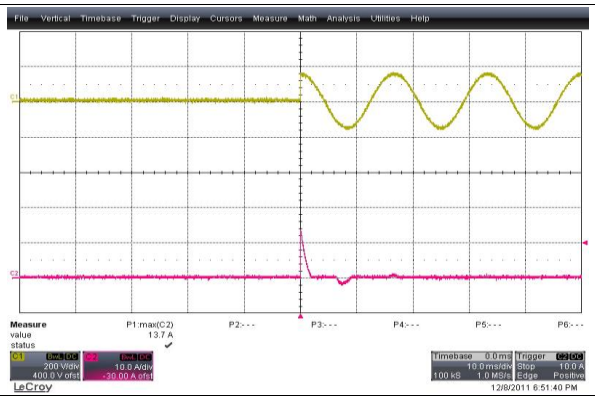
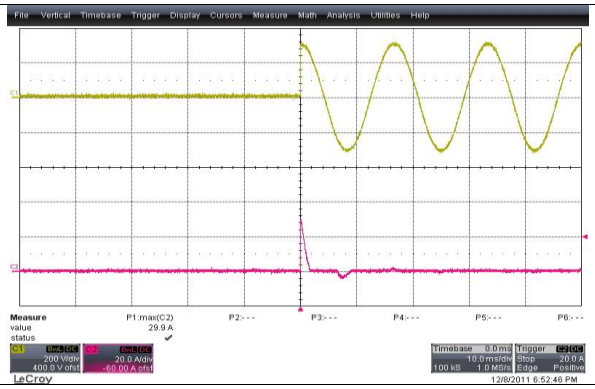
4-2. JSF35-12 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : OUTPUT VOLTAGE - PP005-WS Passive probe
- ◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe
- ◇ CH2 : OUTPUT VOLTAGE - AP015 Current probe

입력	출력	측정값	파형	비고
Turn on time characteristics				
AC110V	I_O=100% 3A	T_{on} = 741ms		CH1(전압) 5V/div 200ms/div CH2(전압) 200V/div 200ms/div
Hold up characteristics				
AC110V	I_O=100% 3A	T_{off} = 21ms		CH1(전압) 5V/div 20ms/div CH2(전압) 200V/div 20ms/div
Over Current protection characteristics				
AC220V	I_O=100% 3A	OCP = 4.1[A] (136%)		CH1(전압) 2.00V/div 2.00ms/div CH2(전류) 1.00A/div 2.00ms/div
Over Voltage protection characteristics				
AC220V	I_O=10% 0.3A	OVP = 4.09[V] (124%)		CH1(전압) 1.00V/div 500ms/div

5-1. JSF35-15 Input characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
◇ CH1 : INPUT VOLTAGE - ADP305 High voltage differential probe
◇ CH2 : INPUT CURRENT - AP015 Current probe
(2) Power Analyzer : 3332 (HIOKI)
(3) Leakage Current Tester : 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고
Inrush Current Characteristics (110V)				
AC110V	I_O=100% (2.4A)	Irush = 13.7[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 10A/div 10ms/div
Inrush Current Characteristics (220V)				
AC220V	I_O=100% (2.4A)	Irush = 29.9[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 20A/div 10ms/div

Input Current & Efficiency Characteristics Condition Ta : 25℃

I_O \ Vin		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current	0.038A	0.038A	0.040A	0.046A	0.056A	0.064A
	Efficiency	-	-	-	-	-	-
Load (50%) 1.2A	Input Current	0.423A	0.362A	0.314A	0.265A	0.232A	0.204A
	Efficiency	80.35%	81.44%	81.44%	80.93%	78.67%	76.92%
Load (100%) 2.4A	Input Current	0.788A	0.658A	0.577A	0.486A	0.416A	0.359A
	Efficiency	81.26%	83.00%	83.72%	83.72%	82.94%	81.81%

Leakage Current Characteristics Condition Ta : 25℃

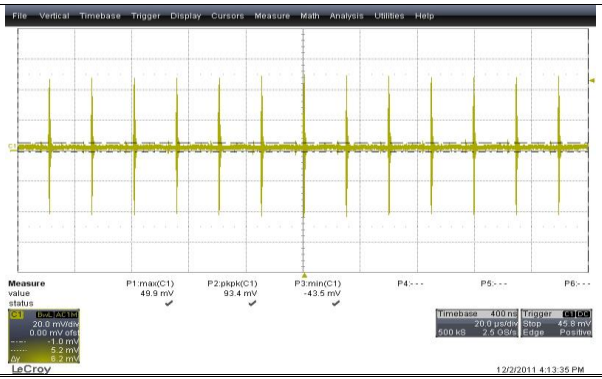
I_O \ Vin	88V	110V	132V	180V	220V	264V
Line L (mA)	0.21	0.25	0.26	0.40	0.48	0.55
Line N (mA)	0.17	0.21	0.28	0.36	0.46	0.57

5-2. JSF35-15 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : INPUT VOLTAGE – PP005-WS Passive probe
- ◇ CH1 : BNC Cable 1.5m, 50Ω, Band Width : 20Mhz
- ◇ CH2 : INPUT CURRENT - AP015 Current probe

Line & Load Regulation Characteristics Condition Ta : 25℃

Vin / I_O	88V	110V	132V	170V	220V	264V	Line Regulation
Load (0A)	15.01	15.01	15.01	15.01	15.01	15.01	0mV
Load (50%)	15.01	15.01	15.01	15.01	15.01	15.01	0mV
Load (100%)	15.01	15.01	15.01	15.01	15.01	15.01	0mV
Load Regulation	0mV	0mV	0mV	0mV	0mV	0mV	

입력	출력	측정값	파형	비고
Dynamic Load Response Characteristics (100Hz)				
AC220V	I_O=0↔100% fs=100Hz Duty=50% Slew rate =100uS	+VPK = 157mV (1.05%) -VPK = 144mV (0.96%)		CH1(전압) 200mV/div 5ms/div CH2(전류) 2A/div 5ms/div
Dynamic Load Response Characteristics (1KHz)				
AC220V	I_O=0↔100% fs=1KHz Duty=50% Slew rate =100uS	+VPK = 176mV (1.17%) -VPK = 131mV (0.87%)		CH1(전압) 200mV/div 1ms/div CH2(전류) 2A/div 1ms/div
Ripple & Noise characteristics				
AC220V	I_O=100% 2.4A	Ripple 6.2mV Ripple & Noise 93.4mV$_{P-P}$		CH1(전압) 20mV/div 20us/div

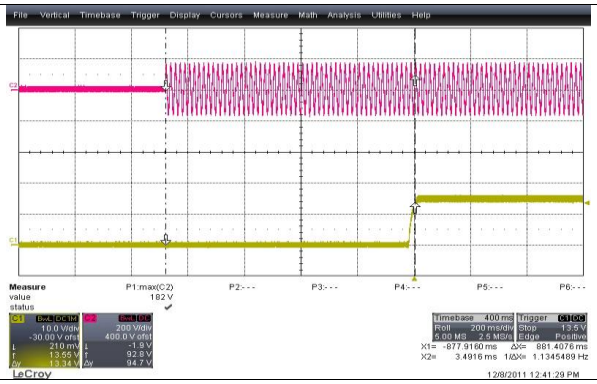
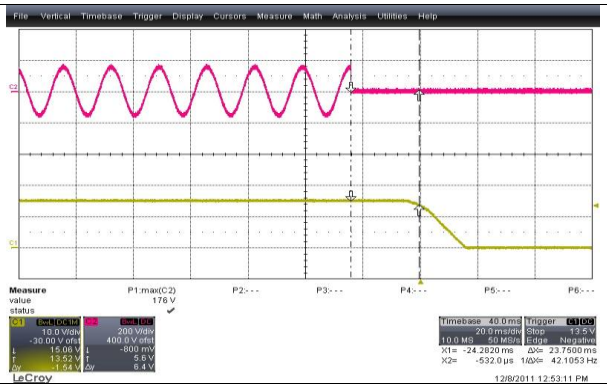
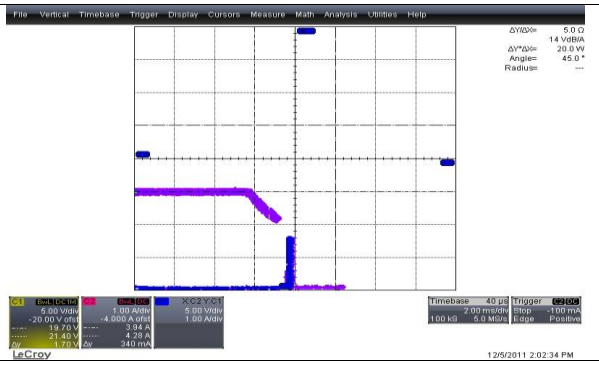
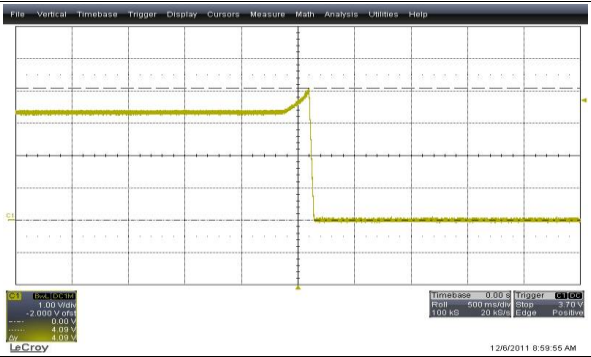
5-2. JSF35-15 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)

◇ CH1 : OUTPUT VOLTAGE - PP005-WS Passive probe

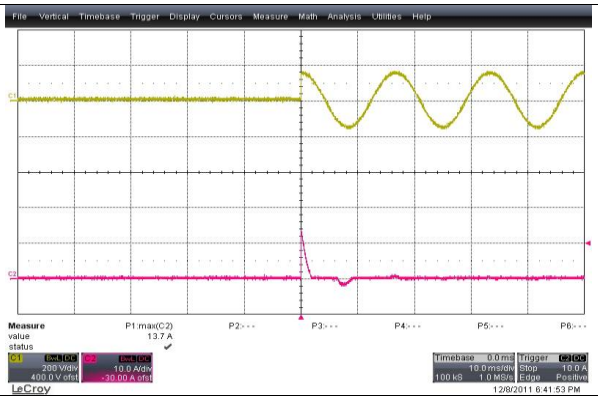
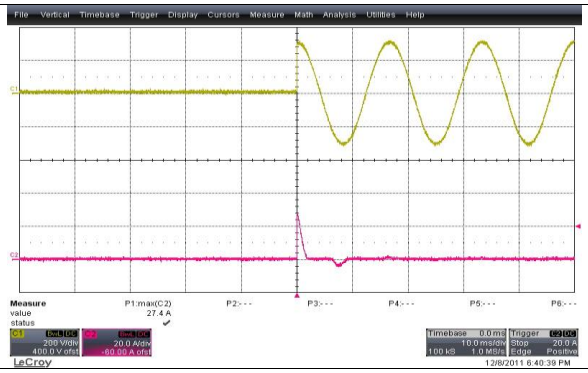
◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe

◇ CH2 : OUTPUT VOLTAGE - AP015 Current probe

입력	출력	측정값	파형	비고
Turn on time characteristics				
AC110V	I_O=100% 2.4A	T_{on} = 881ms		CH1(전압) 10V/div 200ms/div CH2(전압) 200V/div 200ms/div
Hold up characteristics				
AC110V	I_O=100% 2.4A	T_{off} = 23ms		CH1(전압) 10V/div 20ms/div CH2(전압) 200V/div 20ms/div
Over Current protection characteristics				
AC220V	I_O=100% 2.4A	OCP = 3.2[A] (133%)		CH1(전압) 5.00V/div 2.00ms/div CH2(전류) 1.00A/div 2.00ms/div
Over Voltage protection characteristics				
AC220V	I_O=10% 0.24A	OVP = 4.09[V] (124%)		CH1(전압) 1.00V/div 500ms/div

6-1. JSF35-24 Input characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
◇ CH1 : INPUT VOLTAGE - ADP305 High voltage differential probe
◇ CH2 : INPUT CURRENT - AP015 Current probe
(2) Power Analyzer : 3332 (HIOKI)
(3) Leakage Current Tester : 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고
Inrush Current Characteristics (110V)				
AC110V	I_O=100% (1.5A)	Irush = 13.7[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 10A/div 10ms/div
Inrush Current Characteristics (220V)				
AC220V	I_O=100% (1.5A)	Irush = 27.4[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 20A/div 10ms/div

Input Current & Efficiency Characteristics — Condition Ta : 25℃

I_O \ Vin		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current	0.041A	0.040A	0.041A	0.047A	0.058A	0.065A
	Efficiency	-	-	-	-	-	-
Load (50%) 0.75A	Input Current	0.417A	0.354A	0.309A	0.264A	0.235A	0.207A
	Efficiency	81.26%	82.30%	82.20%	81.44%	79.64%	77.25%
Load (100%) 1.5A	Input Current	0.772A	0.652A	0.568A	0.480A	0.425A	0.357A
	Efficiency	83.52%	84.50%	85.10%	85.20%	84.11%	83.33%

Leakage Current Characteristics — Condition Ta : 25℃

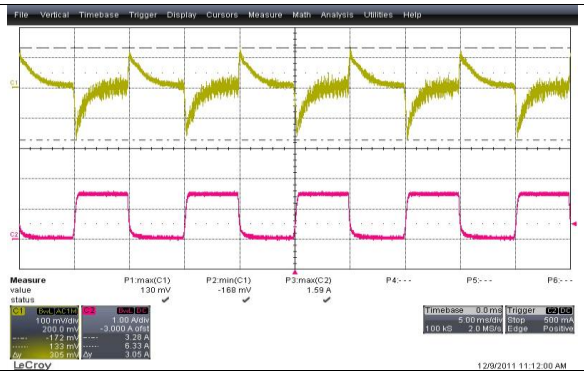
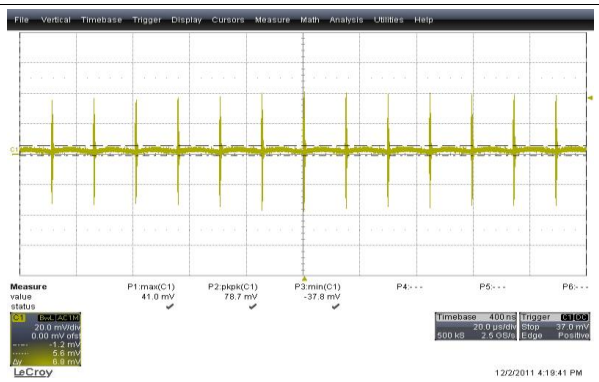
I_O \ Vin	88V	110V	132V	180V	220V	264V
Line L (mA)	0.20	0.24	0.29	0.40	0.49	0.56
Line N (mA)	0.16	0.20	0.25	0.36	0.45	0.54

6-2. JSF35-24 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : INPUT VOLTAGE – PP005-WS Passive probe
- ◇ CH1 : BNC Cable 1.5m, 50Ω, Band Width : 20Mhz
- ◇ CH2 : INPUT CURRENT - AP015 Current probe

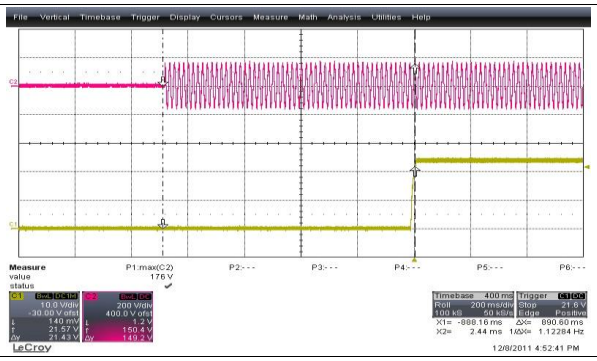
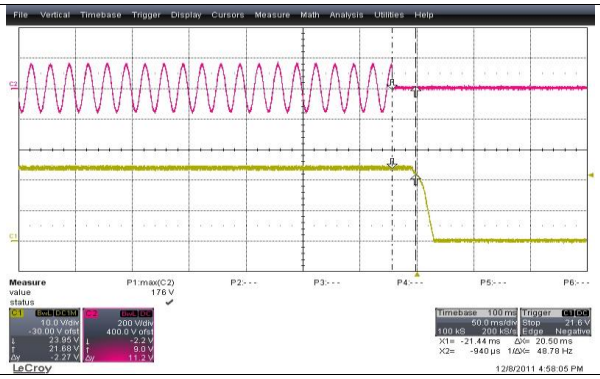
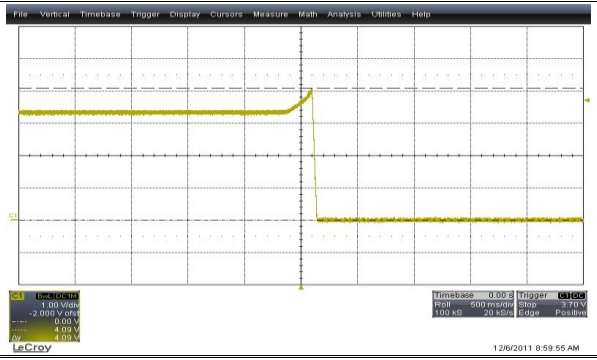
Line & Load Regulation Characteristics Condition Ta : 25℃

Vin / I_O	88V	110V	132V	170V	220V	264V	Line Regulation
Load (0A)	24.06	24.05	24.05	24.05	24.05	24.05	10mV
Load (50%)	24.05	24.05	24.05	24.05	24.05	24.05	0mV
Load (100%)	24.02	24.04	24.05	24.05	24.04	24.05	30mV
Load Regulation	40mV	10mV	0mV	0mV	10mV	0mV	

입력	출력	측정값	파형	비고
Dynamic Load Response Characteristics (100Hz)				
AC220V	I_O=0↔100% fs=100Hz Duty=50% Slew rate =100uS	+VPK = 130mV (0.54%) -VPK = 168mV (0.70%)		CH1(전압) 100mV/div 5ms/div CH2(전류) 1A/div 5ms/div
Dynamic Load Response Characteristics (1KHz)				
AC220V	I_O=0↔100% fs=1KHz Duty=50% Slew rate =100uS	+VPK = 163mV (0.68%) -VPK = 157mV (0.65%)		CH1(전압) 200mV/div 1ms/div CH2(전류) 1A/div 1ms/div
Ripple & Noise characteristics				
AC220V	I_O=100% 1.5A	Ripple 6.8mV Ripple & Noise 78.7mV$_{P-P}$		CH1(전압) 20mV/div 20us/div

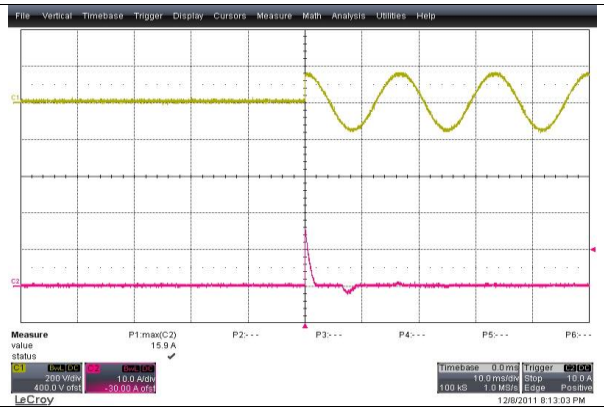
6-2. JSF35-24 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : OUTPUT VOLTAGE - PP005-WS Passive probe
- ◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe
- ◇ CH2 : OUTPUT VOLTAGE - AP015 Current probe

입력	출력	측정값	파형	비고
Turn on time characteristics				
AC110V	I_O=100% 1.5A	T_{on} = 890ms		CH1(전압) 10V/div 200ms/div CH2(전압) 200V/div 200ms/div
Hold up characteristics				
AC110V	I_O=100% 1.5A	T_{off} = 20ms		CH1(전압) 10V/div 50ms/div CH2(전압) 200V/div 50ms/div
Over Current protection characteristics				
AC220V	I_O=100% 1.5A	OCP = 1.95[A] (130%)		CH1(전압) 5.00V/div 2.00ms/div CH2(전류) 500mA/div 2.00ms/div
Over Voltage protection characteristics				
AC220V	I_O=10% 0.15A	OVP = 4.09[V] (124%)		CH1(전압) 1.00V/div 500ms/div

7-1. JSF35-48 Input characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
◇ CH1 : INPUT VOLTAGE - ADP305 High voltage differential probe
◇ CH2 : INPUT CURRENT - AP015 Current probe
(2) Power Analyzer : 3332 (HIOKI)
(3) Leakage Current Tester : 3226 (YOKOGAWA)

입력	출력	측정값	파형	비고
Inrush Current Characteristics (110V)				
AC110V	I_O=100% (0.8A)	Irush = 15.9[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 10A/div 10ms/div
Inrush Current Characteristics (220V)				
AC220V	I_O=100% (0.8A)	Irush = 30.6[A]		CH1(전압) 200V/div 10ms/div CH2(전류) 20A/div 10ms/div

Input Current & Efficiency Characteristics Condition Ta : 25℃

I_O \ Vin		88V	110V	132V	170V	220V	264V
Load (min) 0A	Input Current	0.058A	0.055A	0.055A	0.059A	0.071A	0.076A
	Efficiency	-	-	-	-	-	-
Load (50%) 0.4A	Input Current	0.441A	0.385A	0.336A	0.282A	0.269A	0.231A
	Efficiency	82.05%	81.70%	82.05%	80.33%	77.07%	74.10%
Load (100%) 0.8A	Input Current	0.823A	0.684A	0.602A	0.512A	0.448A	0.376A
	Efficiency	83.47%	84.61%	84.95%	84.58%	84.02%	83.11%

Leakage Current Characteristics Condition Ta : 25℃

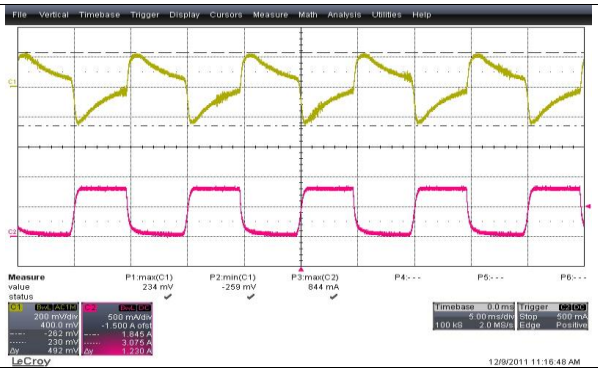
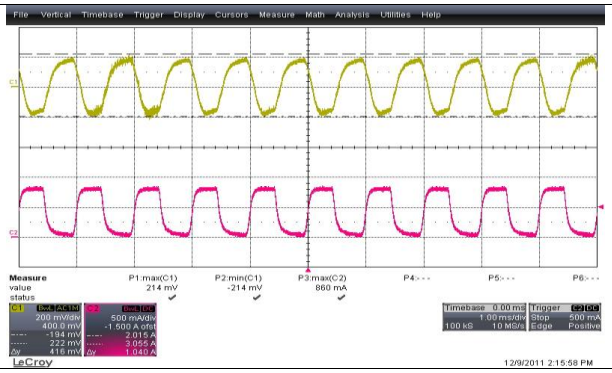
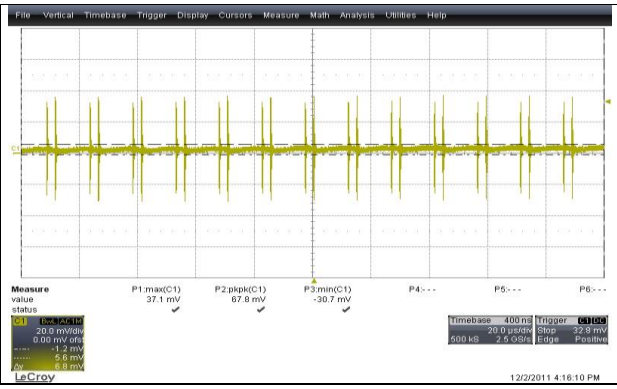
I_O \ Vin	88V	110V	132V	180V	220V	264V
Line L (mA)	0.21	0.25	0.30	0.39	0.45	0.52
Line N (mA)	0.16	0.21	0.27	0.36	0.43	0.51

7-2. JSF35-48 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : INPUT VOLTAGE – PP005-WS Passive probe
- ◇ CH1 : BNC Cable 1.5m, 50Ω, Band Width : 20Mhz
- ◇ CH2 : INPUT CURRENT - AP015 Current probe

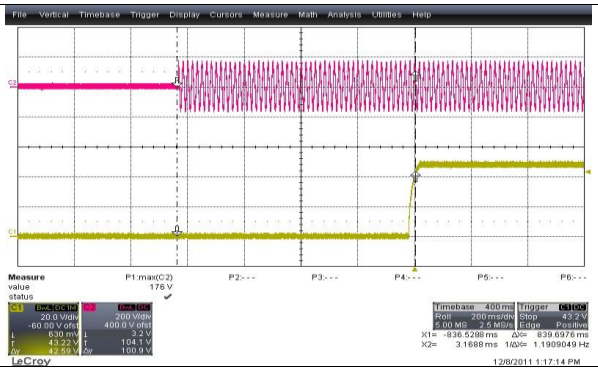
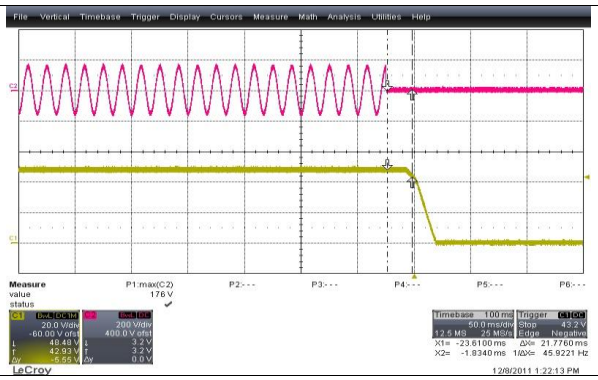
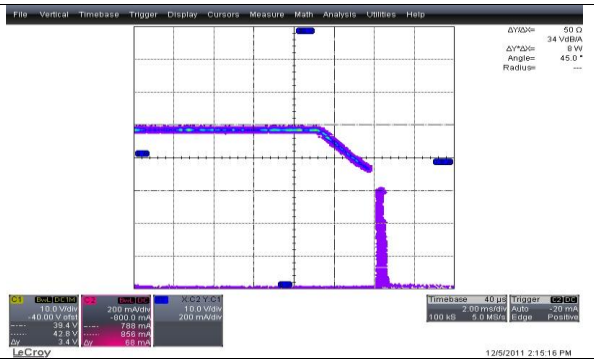
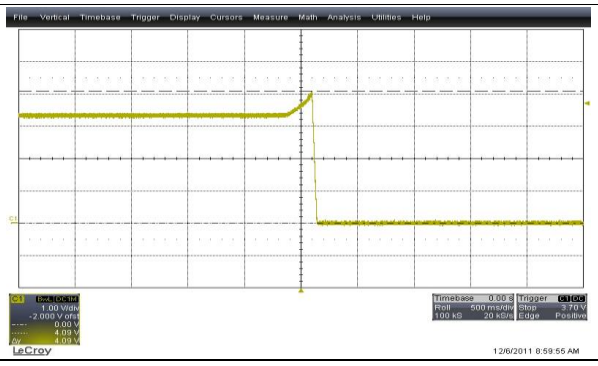
Line & Load Regulation Characteristics Condition Ta : 25℃

Vin / I_O	88V	110V	132V	170V	220V	264V	Line Regulation
Load (0A)	48.01	48.00	48.00	47.99	47.98	47.96	50mV
Load (50%)	48.00	47.98	47.99	47.98	47.95	47.94	60mV
Load (100%)	47.95	47.95	47.96	47.95	47.95	47.95	10mV
Load Regulation	60mV	50mV	40mV	40mV	30mV	20mV	

입력	출력	측정값	파형	비고
Dynamic Load Response Characteristics (100Hz)				
AC220V	I_O=0↔100% fs=100Hz Duty=50% Slew rate =100uS	+VPK = 234mV (0.49%) -VPK = 259mV (0.54%)		CH1(전압) 200mV/div 5ms/div CH2(전류) 500mA/div 5ms/div
Dynamic Load Response Characteristics (1KHz)				
AC220V	I_O=0↔100% fs=1KHz Duty=50% Slew rate =100uS	+VPK = 214mV (0.45%) -VPK = 214mV (0.45%)		CH1(전압) 200mV/div 1ms/div CH2(전류) 500mA/div 1ms/div
Ripple & Noise characteristics				
AC220V	I_O=100% 0.8A	Ripple 6.8mV Ripple & Noise 67.8mV$_{P-P}$		CH1(전압) 20mV/div 20us/div

7-2. JSF35-48 Output characteristics

(1) Oscilloscope : WAVESURFER 24MXs-B (LeCroy)
- ◇ CH1 : OUTPUT VOLTAGE - PP005-WS Passive probe
- ◇ CH2 : INPUT VOLTAGE - ADP305 High voltage differential probe
- ◇ CH2 : OUTPUT VOLTAGE - AP015 Current probe

입력	출력	측정값	파형	비고
Turn on time characteristics				
AC110V	I_O=100% 0.8A	T_{on} = 839ms		CH1(전압) 20V/div 200ms/div CH2(전압) 200V/div 200ms/div
Hold up characteristics				
AC110V	I_O=100% 0.8A	T_{off} = 21ms		CH1(전압) 20V/div 50ms/div CH2(전압) 200V/div 50ms/div
Over Current protection characteristics				
AC220V	I_O=100% 0.8A	OCP = 1.04[A] (130%)		CH1(전압) 10.0V/div 2.00ms/div CH2(전류) 200mA/div 2.00ms/div
Over Voltage protection characteristics				
AC220V	I_O=10% 0.08A	OVP = 4.09[V] (124%)		CH1(전압) 1.00V/div 500ms/div