



TEST REPORT: EPP-200-48

200W Single Output With PFC Function

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

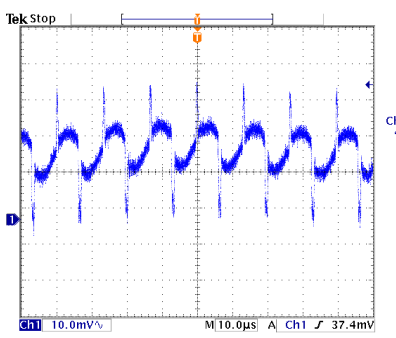
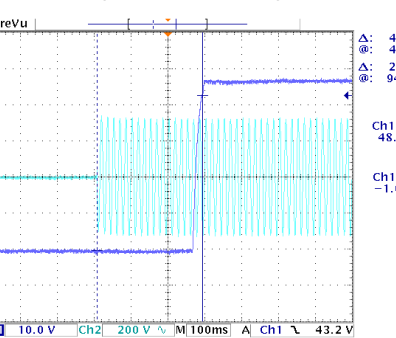
Safety Test

E.M.C. Test

■ RELIABILITY TEST

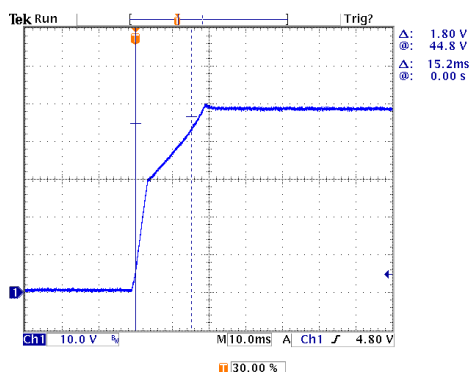
ENVIRONMENT TEST

DESIGN VERIFY TEST OUTPUT FUNCTION

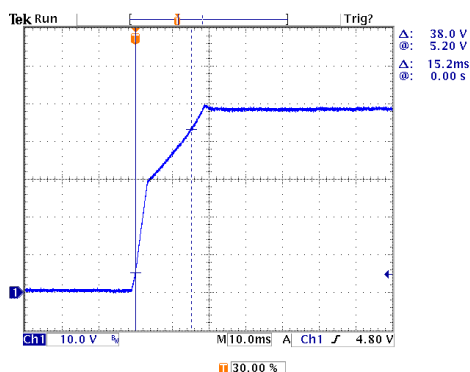
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 45.60V ~ 50.40V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 44.41V ~ 51.42V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.42% ~ 0.37%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA: 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.00% ~ -0.02%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 2.083 %
6	RIPPLE & NOISE(Max)	V1 : 200 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 61.2 mVp-p
	high frequency : 			
7	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P : 230VAC I/P : 115VAC	230VAC 286ms 115VAC 216ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			

8	<p>RISE TIME (MAX.)</p>	<p>230VAC : 30ms 115VAC : 30ms</p>	<p>I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C</p>	<p>230VAC : 15.2ms 115VAC : 15.2ms</p>
9	<p>HOLD UP TIME (TYP.)</p>	<p>230VAC : 12ms 115VAC : 12ms</p>	<p>I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C</p>	<p>230VAC : 21.8ms 115VAC : 21.8ms</p>
10	<p>DYNAMIC LOAD</p>	<p>V1 : 4800 mVp-p</p>	<p>I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA: 25°C</p>	<p>V1: (1). 2430.0mv (2). 860.0mv unit:mVp-p</p>

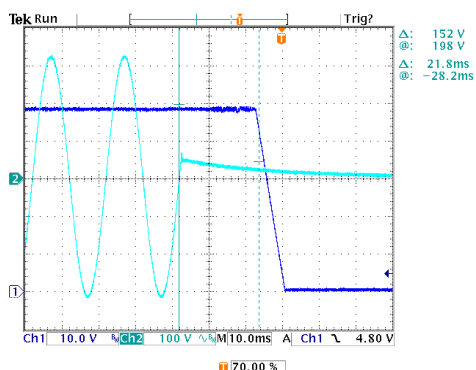
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



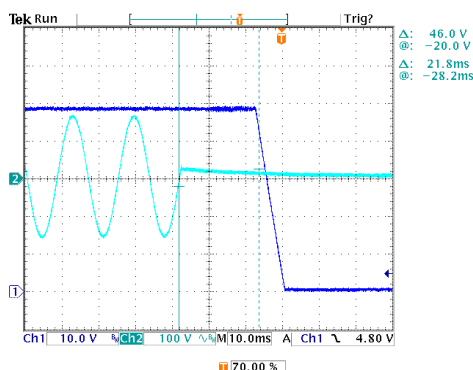
INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage



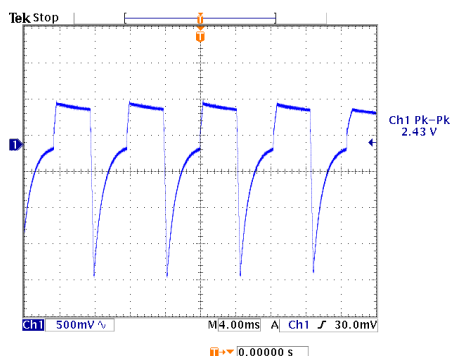
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



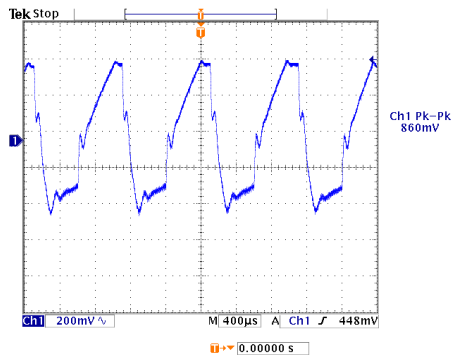
INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



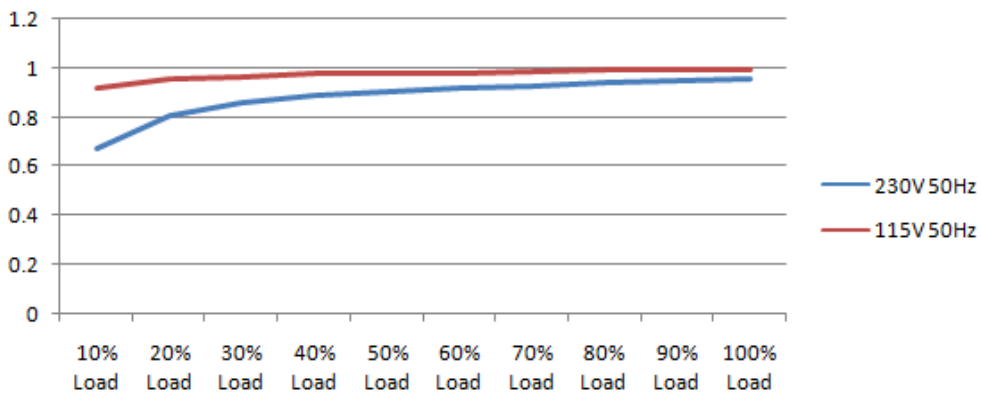
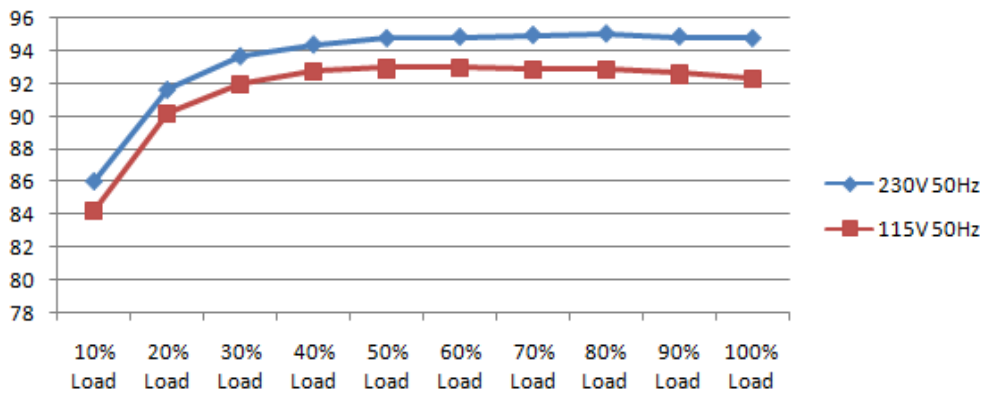
FULL/Min LOAD 50%DUTY / 120HZ

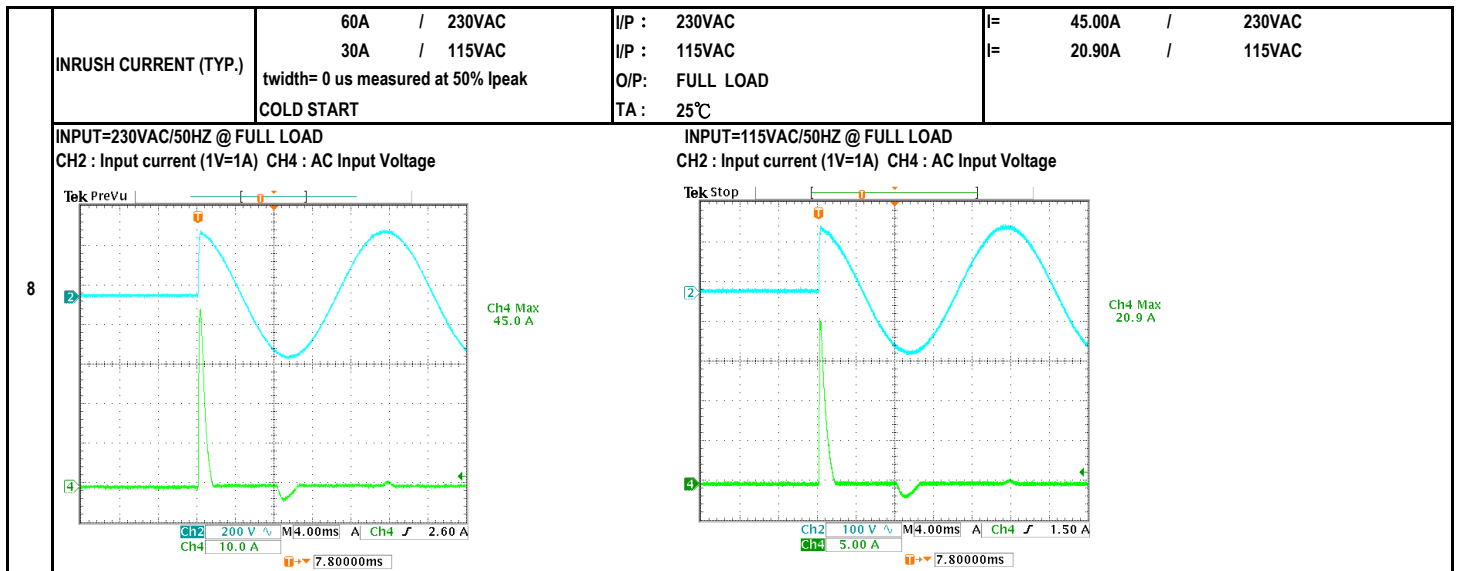


FULL/Min LOAD 50%DUTY / 1KHZ



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC 113VDC ~ 370VDC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE = 77VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	69.0VAC ~ 264VAC 100VDC ~ 370VDC TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 115VAC ~ 264VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	1 / 230VAC 1.8 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.969 / 230VAC I= 1.725 / 115VAC
4	LEAKAGE CURRENT	< 0.75mA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.076 mA N-FG: 0.074 mA O/P-FG: 0.056 mA
5	NO LOAD POWER CONSUMPTION	< 0.50W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.3922 W
6	POWER FACTOR (TYP.)	0.94 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.954 / 230VAC PF= 0.993 / 115VAC
				
7	EFFICIENCY (TYP.)	94.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	94.684 %
				



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110% ~ 140%	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P: TESTING TA : 25°C	123.33% 264VAC 123.33% 230VAC 123.33% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	52.80V ~ 62.40V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25°C	57.60V 264VAC 57.60V 230VAC 57.60V 80VAC Shut down Re- power ON
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup Mode
4	OVER TEMPERATURE PROTECTION	Shut down Re- power ON	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD	O.T.P. Active Shut down Re- power ON

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	AUXILIARY POWER	12V / 0.5A ripple & noise: * mv Tolerance: -15~15 %	I/P: 230VAC O/P: FULL LOAD TA : 25°C	11.54 V/ 0.4993 A ripple & noise: * mv Tolerance: -3.833 %

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q5 Rated : 500V 13.0A Q6 Rated : 500V 13.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q5 Q6 (1). 492.00V 490.00V (2). 488.00V 488.00V (3). 440.00V 450.00V
2	Input Capacitor	C5 Rated : 100uf 420V	I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 418.00V (2). 413.00V (3). 418.00V

3	Control IC	U1 Rated : 38.0V (max) 13.0V (min)	U101 Rated : 24V (max) 6V (min)	I/P : 267VAC O/P : (1)Full Load (2)Output Short (3)O.L.P (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1 26.50V U101 12.50V (1). (2). 20.10V 1.97V (3). 20.10V 1.97V (4). 28.40V 13.60V (5). 21.40V 10.30V
4	O/P Diode (MOSFET)	Q101 Rated : 150V 18A	Q102 Rated : 150V 18A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q101 108.00V Q102 108.00V (1). (2). 10.20V 11.90V (3). 106.00V 206.00V
5	PFC Power Transistor	Q1 Rated : 600V 20.2A		I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 552.00V (2). 552.00V (3). 502.00V
6	PFC Diode	D1 Rated : 600V 5.0A		I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Dynamic Load Full/Min Load 90%Duty/5KHz (4)Dynamic Load Full/Min Load 50%Duty/120Hz Ta : 25°C	(1). 508.00V (2). 458.00V (3). 518.00V (4). 528.00V

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.000KVAC /min I/P-FG : 2.000KVAC /min O/P-FG : 0.600KVAC /min	I/P-O/P: 3.600KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 0.600KVAC /min Ta : 25°C	I/P-O/P: 1.01mA I/P-FG: 1.38mA O/P-FG: 0.58mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ	I/P-O/P: 500VDC I/P-FG: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9999MΩ I/P-FG: 9999MΩ NO DAMAGE

E.M.C. TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR: 8KV / Contact: 4KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N: 2KV/L/N-PE: 4KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL : EPP-200-24		
		1. ROOM AMBIENT BURN-IN : 1.0hrs		
		IP: 230VAC O/P: 100% LOAD TA= 18.5℃		
		2. HIGH AMBIENT BURN-IN : 1.0hrs		
		IP: 230VAC O/P: 100% LOAD TA= 49.3℃		
			NO. Position ROOM AMBIENT 18.5℃ HIGH AMBIENT Ta: 49.3℃	
			1 RTH1 64.1℃ 82.3℃	
			2 LF1 28.2℃ 57.0℃	
			3 LF2 29.2℃ 59.7℃	
			4 L2 31.0℃ 61.3℃	
			5 BD1 39.3℃ 69.1℃	
			6 C5 30.2℃ 59.8℃	
			7 Q1 44.5℃ 74.9℃	
			8 C81 23.0℃ 53.0℃	
			9 RTH2 24.8℃ 54.5℃	
			10 T1 COIL 47.7℃ 78.2℃	
2	OVER LOAD BURN-IN TEST			
		NO DAMAGE	I/P : 230VAC	TEST : OK
		1 HOUR (MIN)	O/P : 119.00% LOAD	
			Ta : 25℃	
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 115VAC O/P : FULL LOAD Ta : -30.0℃	TEST : OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃ NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50℃ HUMIDITY= 95.0% RH	TEST : OK
5	TEMPERATURE COEFFICIENT	±0.03% /(0℃~50℃)	I/P : 230VAC O/P : FULL LOAD	±0.0000% /(0℃~50℃)
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃ ~ +85℃		TEST : OK
		2. Temperature change rate : 25℃ / MIN		
		3. Dwell time low and high temperature : 30 MIN/EACH		
		4. Total test cycle : 5 CYCLE		
		5. Input/Output condition : STATIC		
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35℃ ~ +55℃		TEST : OK
		2. Temperature change rate : 25℃ / MIN		
		3. Dwell time low and high temperature : 30 MIN/EACH		
		4. Total test cycle : 10 CYCLE		
		5. Input/Output condition : 230VAC Full Load AC ON/OFF test turn on 58sec ; turn off 2sec		
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (4) Acceleration : 2G (5) Test Time : 60 min in each axis (X.Y.Z) (6) Ta : 25℃		TEST : OK
9	CAPACITOR LIFE CYCLE	:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0℃ LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50.0℃ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50.0℃ LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50.0℃ LIFE TIME	(1). 437778 HRS (2). 80132 HRS (3). 179640 HRS (4). 297469.9 HRS	
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 500.2 KHRS		
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 50℃		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

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