



150W Single Output Switching Power Supply

NES-150 series



■ Features :

- AC input range selectable by switch
- Protections: Short circuit / Overload / Over voltage
- Cooling by free air convection
- LED indicator for power on
- 100% full load burn-in test
- High efficiency, long life and high reliability
- 2 years warranty

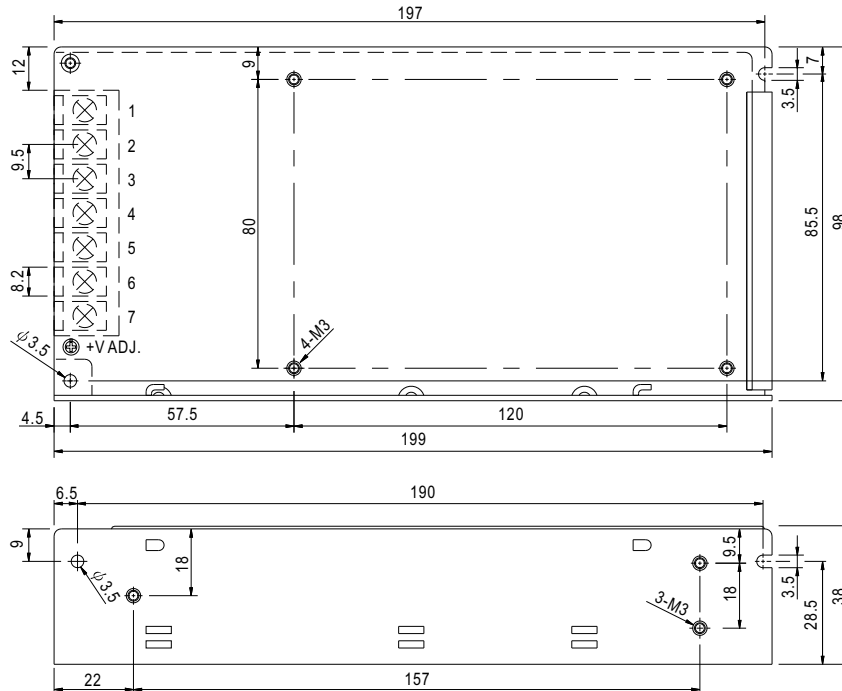


SPECIFICATION

MODEL		NES-150-3.3	NES-150-5	NES-150-7.5	NES-150-9	NES-150-12	NES-150-15	NES-150-24	NES-150-48
OUTPUT	DC VOLTAGE	3.3V	5V	7.5V	9V	12V	15V	24V	48V
	RATED CURRENT	30A	26A	20A	16.7A	12.5A	10A	6.5A	3.3A
	CURRENT RANGE	0 ~ 30A	0 ~ 26A	0 ~ 20A	0 ~ 16.7A	0 ~ 12.5A	0 ~ 10A	0 ~ 6.5A	0 ~ 3.3A
	RATED POWER	99W	130W	150W	150W	150W	150W	156W	158.4W
	RIPPLE & NOISE (max.) Note.2	80mVp-p	80mVp-p	120mVp-p	120mVp-p	120mVp-p	120mVp-p	120mVp-p	200mVp-p
	VOLTAGE ADJ. RANGE	3.2 ~ 3.5V	4.75 ~ 5.5V	7.13 ~ 8.3V	8.55 ~ 9.9V	11.4 ~ 13.5V	14.25 ~ 16.5V	22.8 ~ 27.6V	45.6 ~ 52.8V
	VOLTAGE TOLERANCE Note.3	±3.0%	±2.0%	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%
	LINE REGULATION Note.4	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	LOAD REGULATION Note.5	±2.0%	±1.0%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	SETUP, RISE TIME Note.7	800ms, 20ms/230VAC 1200ms, 30ms/115VAC at full load							
HOLD UP TIME (Typ.)	24ms/230VAC 20ms/115VAC at full load								
INPUT	VOLTAGE RANGE	90 ~ 132VAC / 180 ~ 264VAC selected by switch 254 ~ 373VDC							
	FREQUENCY RANGE	47 ~ 63Hz							
	EFFICIENCY (Typ.)	73%	78%	80%	83%	83%	83%	86%	86%
	AC CURRENT (Typ.)	3A/115VAC 2A/230VAC							
	INRUSH CURRENT (Typ.)	COLD START 45A/230VAC							
	LEAKAGE CURRENT	<2mA / 240VAC							
PROTECTION	OVERLOAD	110 ~ 150% rated output power Protection type : Hiccup mode, recovers automatically after fault condition is removed							
	OVER VOLTAGE	3.8 ~ 4.65V	5.75 ~ 6.75V	8.6 ~ 10.1V	10.4 ~ 12.2V	13.8 ~ 16.2V	17.25 ~ 20.25V	27.6 ~ 32.4V	55.2 ~ 62.4V
		Protection type : Hiccup mode, recovers automatically after fault condition is removed							
ENVIRONMENT	WORKING TEMP.	-20 ~ +60℃ (Refer to output load derating curve)							
	WORKING HUMIDITY	20 ~ 90% RH non-condensing							
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH							
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)							
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes							
SAFETY & EMC (Note 6)	SAFETY STANDARDS	UL60950-1, TUV EN60950-1 Approved							
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:1.5KVAC O/P-FG:0.5KVAC							
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms/500VDC 70% RH							
	EMI CONDUCTION & RADIATION	Compliance to EN55022 (CISPR22) Class B							
	HARMONIC CURRENT	Compliance to EN61000-3-2,-3							
	EMS IMMUNITY	Compliance to EN61000-4-2, 3, 4, 5, 6, 8,11, ENV50204, EN55024, EN61000-6-1, heavy industry level, criteria A							
OTHERS	MTBF	433.3Khrs min. MIL-HDBK-217F (25℃)							
	DIMENSION	199*98*38mm (L*W*H)							
	PACKING	0.7Kg; 30pcs/22Kg/1.24CUFT							
NOTE	1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature. 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. 3. Tolerance : includes set up tolerance, line regulation and load regulation. 4. Line regulation is measured from low line to high line at rated load. 5. Load regulation is measured from 0% to 100% rated load. 6. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives. 7. Length of set up time is measured at cold first start. Turning ON/OFF the power supply very quickly may lead to increase of the set up time.								

Mechanical Specification

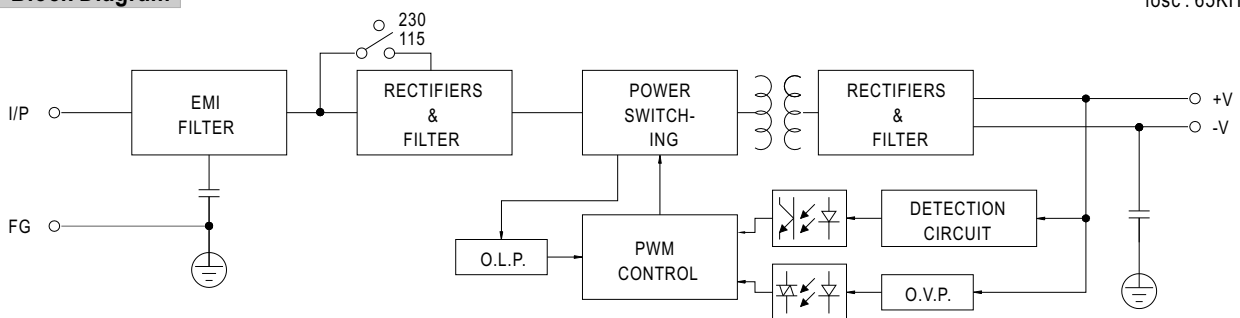
Case No. 902 Unit:mm



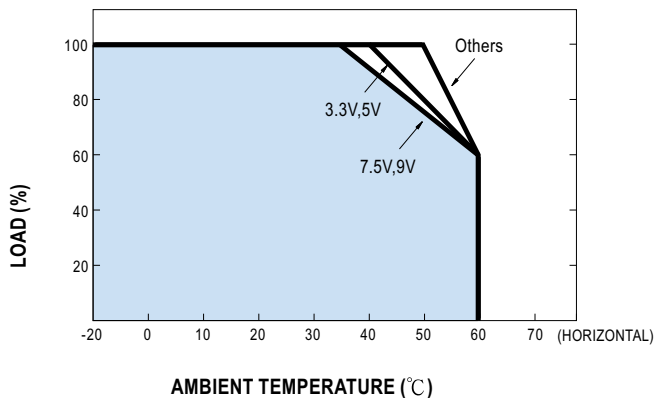
Terminal Pin No. Assignment

Pin No.	Assignment	Pin No.	Assignment
1	AC/L	4,5	DC OUTPUT -V
2	AC/N	6,7	DC OUTPUT +V
3	FG $\perp$		

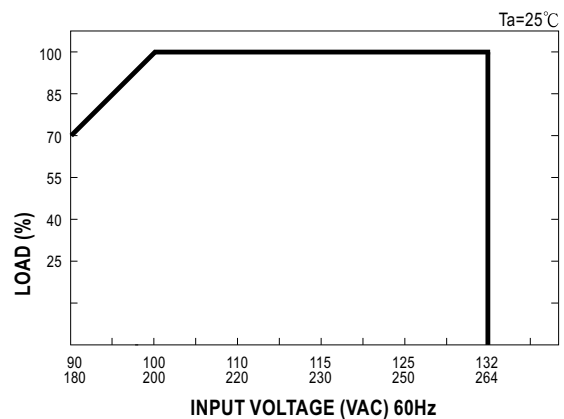
Block Diagram



Derating Curve



Static Characteristics



MODEL : NES-150-9
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1: 120 mVp-p (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	V1: 39 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 8.55 V~ 9.9 V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	10.179V~ 7.666V/ 230VAC 10.178V~ 7.666V/ 115VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1: -1 %~ 1 % (Max)	I/P: 200 VAC / 264 VAC O/P:FULL/ 0 % LOAD Ta:25°C	V1: 0%~ 0.13 %	P
4	LINE REGULATION	V1:-0.5 %~ 0.5 % (Max)	I/P: 200 VAC ~ 264 VAC O/P:FULL LOAD Ta:25°C	V1: 0 %~ 0 %	P
5	LOAD REGULATION	V1: -0.5 %~ 0.5 % (Max)	I/P:230 VAC O/P:FULL ~MIN LOAD Ta:25°C	V1:-0.07%~ 0.07 %	P
6	SET UP TIME	230 VAC/800 ms (Max) 115 VAC/1200 ms (Max)	I/P:230 VAC I/P:115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 351.757 ms 115VAC/ 356.162 ms	P
7	RISE TIME	230 VAC/20 ms (Max) 115 VAC/30 ms (Max)	I/P:230 VAC I/P:115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 5.797 ms 115VAC/ 5.855 ms	P
8	HOLD UP TIME	230 VAC/ 24 ms (TYP) 115 VAC/ 20 ms (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 5.665 ms 115VAC/ 5.684 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST: 0.44 %	P
10	DYNAMIC LOAD	V1: 900 mVp-p	I/P: 230 VAC O/P:FULL /Min LOAD 90%DUTY/1KHZ Ta:25°C	334 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	176VAC~ 264 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	136 V ~ 264 V	P
			I/P: LOW-LINE-3V= 177 V HIGH-LINE+15%= 300 V O/P:FULL/MIN LOAD ON: 30 Sec . OFF: 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST: OK	
2	INPUT FREQUENCY RANGE	47 HZ ~ 63 HZ NO DAMAGE OSC	I/P: 200 VAC ~ 264 VAC O/P:FULL-MIN LOAD Ta:25°C	TEST: OK	P
3	EFFICIENCY	83 % (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	83.36%	P
4	INPUT CURRENT	230 V/ 2 A (TYP) 115 V/ 3 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 1.505 A/ 230 VAC I = 2.681A/ 115 VAC	P
5	INRUSH CURRENT	230 V/ 45 A (TYP) COLD START	I/P:230 VAC O/P:FULL LOAD Ta:25°C	I = 42.906A/ 230 VAC	P
6	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P:264 VAC O/P:Min LOAD Ta:25°C	L-FG: 1.35 mA N-FG: 1.05 mA	P



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	110 %~ 150 %	I/P: 230VAC O/P: TESTING Ta:25°C	130.29%/230VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1: 10.4 V~ 12.2 V(Typ)	I/P: 230 VAC O/P: MIN LOAD Ta:25°C	11.4V/ 230 VAC Hiccup Model	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264 VAC O/P: Full LOAD Ta:25°C	NO DAMAGE Hiccup Mode	P

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																	
1	TEMPERATURE RISE TEST	MODEL : NES-150-5V 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P: 230 VAC O/P: FULL LOAD Ta= 27.1 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P: 230 VAC O/P: FULL LOAD Ta= 43.5 °C <table><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta=27.1 °C</th><th>HIGH AMBIENT Ta=43.5°C</th></tr><tr><td>1</td><td>C5</td><td>330U/200V 105°C HP</td><td>73.8°C</td><td>79.1°C</td></tr><tr><td>2</td><td>D1</td><td>BYV26EGP 1A/1KV</td><td>106.6°C</td><td>114.8°C</td></tr><tr><td>3</td><td>BD1</td><td>KBJ608G 6A/800V</td><td>82.1°C</td><td>87.9°C</td></tr><tr><td>4</td><td>LF1</td><td>LF-058</td><td>60.0°C</td><td>65.2°C</td></tr><tr><td>5</td><td>R3</td><td>150K/2W</td><td>107.7°C</td><td>107.9°C</td></tr><tr><td>6</td><td>ZD1</td><td>P1.5KE440A</td><td>102.8°C</td><td>110.2°C</td></tr><tr><td>7</td><td>ZD3</td><td>P6KE200A</td><td>97.5°C</td><td>106.7°C</td></tr><tr><td>8</td><td>U1</td><td>P1216AP06</td><td>91.8°C</td><td>102.4°C</td></tr><tr><td>9</td><td>Q1</td><td>2SK2082 9A/900V</td><td>99.7°C</td><td>109.3°C</td></tr><tr><td>10</td><td>D60</td><td>SBL3060PT 30A/60V</td><td>107.1°C</td><td>114.1°C</td></tr><tr><td>11</td><td>T1 COIL</td><td>TF-1599</td><td>107.0°C</td><td>114.6°C</td></tr><tr><td>12</td><td>C10</td><td>220U/35V 105°C GL</td><td>85.4°C</td><td>95.4°C</td></tr></table>			NO	Position	P/N	ROOM AMBIENT Ta=27.1 °C	HIGH AMBIENT Ta=43.5°C	1	C5	330U/200V 105°C HP	73.8°C	79.1°C	2	D1	BYV26EGP 1A/1KV	106.6°C	114.8°C	3	BD1	KBJ608G 6A/800V	82.1°C	87.9°C	4	LF1	LF-058	60.0°C	65.2°C	5	R3	150K/2W	107.7°C	107.9°C	6	ZD1	P1.5KE440A	102.8°C	110.2°C	7	ZD3	P6KE200A	97.5°C	106.7°C	8	U1	P1216AP06	91.8°C	102.4°C	9	Q1	2SK2082 9A/900V	99.7°C	109.3°C	10	D60	SBL3060PT 30A/60V	107.1°C	114.1°C	11	T1 COIL	TF-1599	107.0°C	114.6°C	12	C10	220U/35V 105°C GL	85.4°C	95.4°C	P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P: 230 VAC O/P: 117%LOAD Ta:25°C	TEST : OK	P																																																																	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 230 VAC O/P: 100% LOAD Ta= -25 °C	TEST : OK	P																																																																	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40°C NO DAMAGE	I/P: 272 VAC O/P:FULL LOAD Ta= 40°C HUMIDITY= 95 %R.H	TEST : OK	P																																																																	
5	TEMPERATURE COEFFICIENT	± 0.03 %(0-50°C)	I/P: 230 VAC O/P:FULL LOAD	± 0.01 %(0-50°C)	P																																																																	
6	VIBRATION TEST	1 Set (1) Waveform: Sine Wave (2) Frequency:10-500Hz (3) Sweep Time:10min/sweep cycle (4) Acceleration:5G (5) Test Time:1 hour in each axis (X.Y.Z) (6) Ta:25°C		TEST : OK	P																																																																	

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 3 KVAC/min I/P-FG: 1.5 KVAC/min O/P-FG: 0.5 KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 1.8 KVAC/min O/P-FG: 0.6 KVAC/min Ta:25°C	I/P-O/P: 7.41 mA I/P-FG: 6.28mA O/P-FG: 7.13 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 23.9G Ω I/P-FG: 25.1G Ω O/P-FG: 23.6G Ω NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25°C	8 mΩ	P
4	APPROVAL	TUV: Certificate NO : UL: File NO :			N/A

E.M.C TEST

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

M.T.B.F & LIFE CYCLE CALCULATION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	CAPACITOR LIFE CYCLE	SUPPOSE C64 IS THE MOST CRITICAL COMPONENT I/P: 230 VAC O/P:FULL LOAD Ta= 25 °C LIFE TIME= 38043 HRS I/P: 230 VAC O/P:FULL LOAD Ta= 40 °C LIFE TIME= 20226 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 244K HRS			P
3	ORT (Ongoing Reliability test)	NES-150-24:I/P : 230VAC O/P : FULL LOAD TA=50°C Sample=10pcs TEST TIME=576HRS			P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 2SK2082 : 900V / 9 A	I/P:High-Line +3V =267 V O/P: (1)Full Load Input on/off (2)Output Short Ta:25°C	(1) 876 V (2) 872 V	P
2	Diode Peak Voltage	D60 Rated SBL3060FG: 60V/25A	I/P:High-Line +3V =267 V O/P: (1)Full Load T Input on/off (2)Output Short Ta:25°C	(1) 49.6 V (2) 48.6 V	P
3	Clamp Diode Peak Voltage	D1 Rated BYV26E :1K V / 1 A	I/P:High-Line +3V =267 V O/P: (1) Dynamic Load 90%Duty/1KHz Ta:25°C	(1) 716 V	P
4	Input Capacitor Voltage	C5 Rated CAPXON: 330u /200 V 105°C / HP Series	I/P:High-Line +3V =267 V O/P: (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta:25°C	(1) 189 V (2) 188 V (3) 186 V	P
5	Control IC Voltage Test	U1 Rated NCP 1216A : 5.6V	I/P:High-Line +3V =267 V O/P: (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta:25°C	(1) 15.3 V (2) 15.6 V (3) 13 V (4) 11.5 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2007/4/19	RD SAMPLE	PASS	VINCENT TSENG	MAX LIN

2003/12/12 A50-F023