



### Features :

- Universal AC input / Full range
- Protections: Short circuit / Overload / Over voltage
- Built-in active PFC function
- Cooling by free air convection
- Output current level adjustable
- 100% full load burn-in test
- High reliability
- Suitable for built-in applications of LED lighting
- 2 years warranty

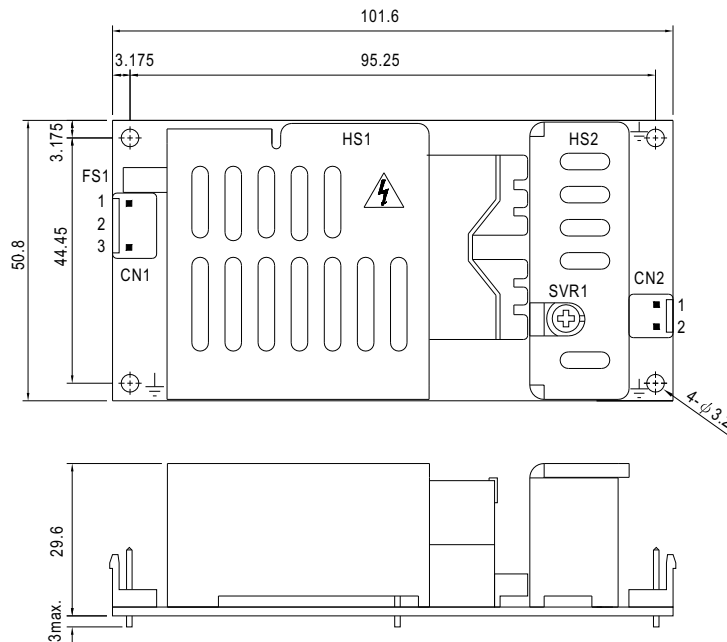


### SPECIFICATION

MODEL	PLP-60-12	PLP-60-24	PLP-60-48	
OUTPUT	DC VOLTAGE	12V	24V	48V
	CONSTANT CURRENT OPERATION VOLTAGE <small>Note.5</small>	9 ~ 12V	18 ~ 24V	36 ~ 48V
	RATED CURRENT	5A	2.5A	1.3A
	CURRENT RANGE	0 ~ 5A	0 ~ 2.5A	0 ~ 1.3A
	RATED POWER	60W	60W	62.5W
	RIPPLE & NOISE (max.) <small>Note.2</small>	4.5Vp-p	4.5Vp-p	4.8Vp-p
	CURRENT ADJ. RANGE	3.75 ~ 5A	1.875 ~ 2.5A	0.975 ~ 1.3A
	VOLTAGE TOLERANCE <small>Note.3</small>	±10%		
	LINE REGULATION	±3.0%		
	LOAD REGULATION	±5.0%		
SETUP TIME	1000ms / 230VAC 2000ms / 115VAC at full load			
INPUT	VOLTAGE RANGE <small>Note.4</small>	90 ~ 264VAC		
	FREQUENCY RANGE	47 ~ 63Hz		
	POWER FACTOR	PF ≥ 0.9 at 75 ~ 100% load, 115VAC / 230VAC		
	EFFICIENCY(Typ.)	84%	88%	89%
	AC CURRENT	0.8A/115VAC 0.4A/230VAC		
	INRUSH CURRENT(max.)	42A/230VAC		
	LEAKAGE CURRENT	<0.75mA / 240VAC		
PROTECTION	OVER CURRENT <small>Note.5</small>	100 ~ 110% Protection type : Constant current limiting, recovers automatically after fault condition is removed		
	SHORT CIRCUIT	Protection type : Hiccup mode, recovers automatically after fault condition is removed		
	OVER VOLTAGE	15 ~ 18V	28 ~ 35V	57 ~ 63V Protection type : Shut down o/p voltage, re-power on to recover
ENVIRONMENT	WORKING TEMP.	-30 ~ +70°C (Refer to output load derating curve)		
	WORKING HUMIDITY	20 ~ 95% RH non-condensing		
	STORAGE TEMP., HUMIDITY	-40 ~ +80°C, 10 ~ 95% RH		
	TEMP. COEFFICIENT	±0.03%/°C (0 ~ 50°C)		
SAFETY & EMC	VIBRATION	10 ~ 500Hz, 2G 12min./1cycle, period for 72min. each along X, Y, Z axes		
	SAFETY STANDARDS	TUV EN61347-1, EN61347-2-13 approved ; design refer to UL60950-1		
	WITHSTAND VOLTAGE	I/P-O/P:3.75KVAC I/P-FG:1.88KVAC O/P-FG:0.5KVAC		
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25°C / 70% RH		
	EMI CONDUCTION & RADIATION	Compliance to EN55015		
	HARMONIC CURRENT	Compliance to EN61000-3-2 Class C(≥ 75% load); EN61000-3-3		
OTHERS	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; ENV50204, EN55024, EN61547, light industry level, criteria A		
	MTBF	583.3Khrs min. MIL-HDBK-217F (25°C)		
	DIMENSION	101.6*50.8*29.6mm (L*W*H)		
	PACKING	0.16Kg; 96pcs/16.4Kg/0.89CUFT		
NOTE	<ol style="list-style-type: none"> <li>1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°C of ambient temperature.</li> <li>2. Ripple &amp; noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf &amp; 47uf parallel capacitor, direct connecting to LED's is not suggested for models with "RIPPLE &amp; NOISE" &gt; ±10% and using additional drivers is highly recommended.</li> <li>3. Tolerance : includes set up tolerance, line regulation and load regulation.</li> <li>4. Derating may be needed under low input voltage. Please check the static characteristics for more details.</li> <li>5. Constant current operation region is within 75% ~100% rated output voltage. This is the suitable operation region for LED related applications, but please reconfirm special electrical requirements for some specific system design.</li> <li>6. Heat sink HS1,HS2 can not be shorted.</li> <li>7. Heat sink HS1 must have safety isolation distance with system case.</li> <li>8. The power supply is considered as a component that will be operated in combination with final equipment. Since EMC performance will be affected by the complete installation, the final equipment manufacturers must re-qualify EMC Directive on the complete installation again.</li> </ol>			

**Mechanical Specification**

Unit:mm



- ⚠ 1.HS1,HS2 can not be shorted.
- ⚠ 2.HS1 must have safety isolation distance with system case.

AC Input Connector (CN1) : JST B3P-VH or equivalent

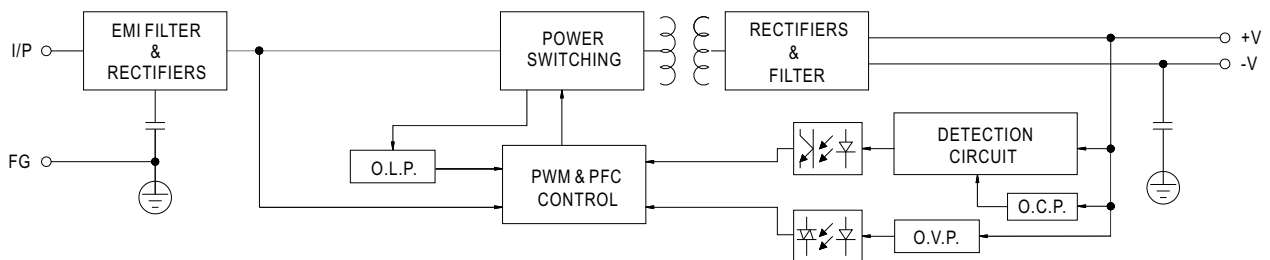
Pin No.	Assignment	Mating Housing	Terminal
1	AC/L	JST VHR or equivalent	JST SVH-21T-P1.1 or equivalent
2	No Pin		
3	AC/N		

DC Output Connector (CN2) : JST B2P-VH or equivalent

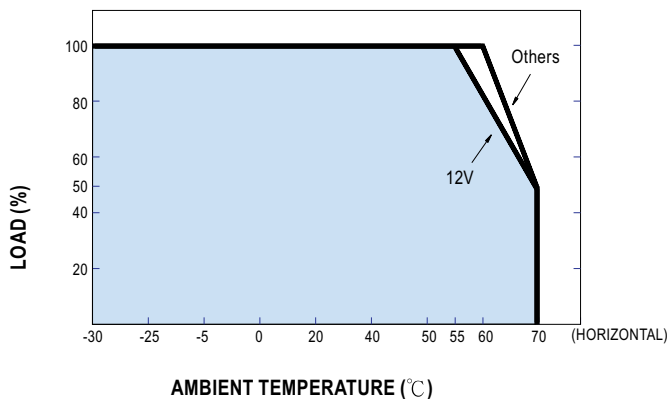
Pin No.	Assignment	Mating Housing	Terminal
1	+V	JST VHR or equivalent	JST SVH-21T-P1.1 or equivalent
2	-V		

**Block Diagram**

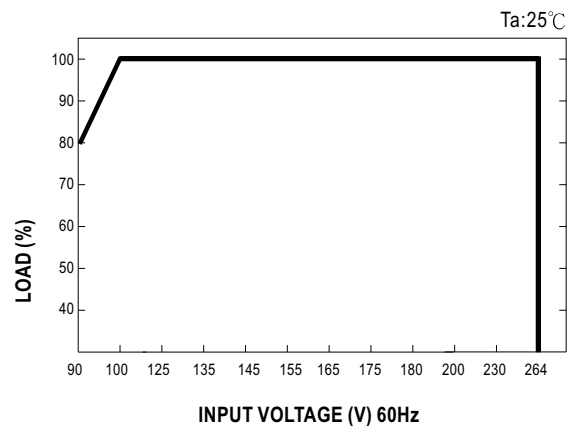
fosc : 90KHz(115VAC)  
120KHz(230VAC)



**Derating Curve**



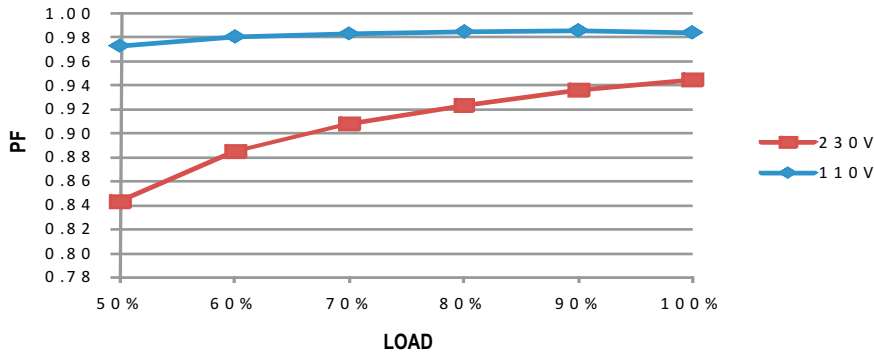
**Static Characteristics**



**Power Factor Characteristic**

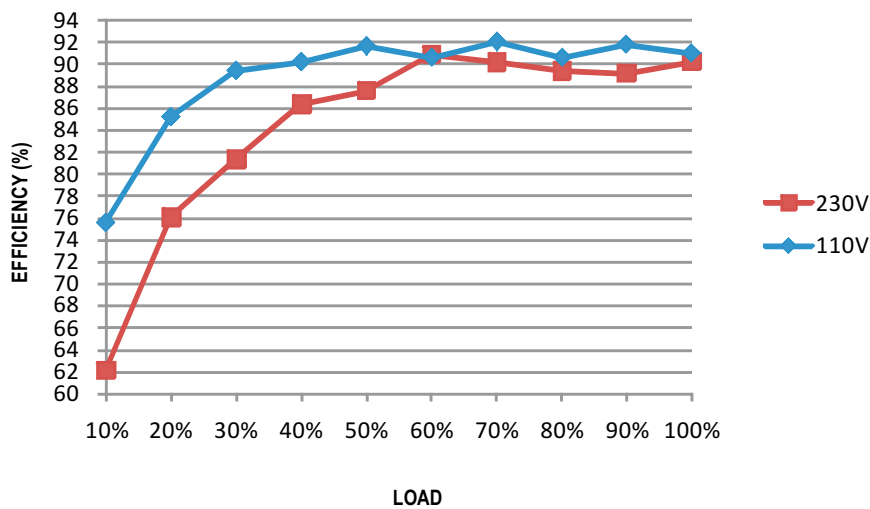
Power factor will be higher than 0.9 when output loading is 75% or higher.

**Constant Current Mode**



**EFFICIENCY vs LOAD (48V Model)**

PLP-60 series possess superior working efficiency that up to 89% can be reached in field applications.

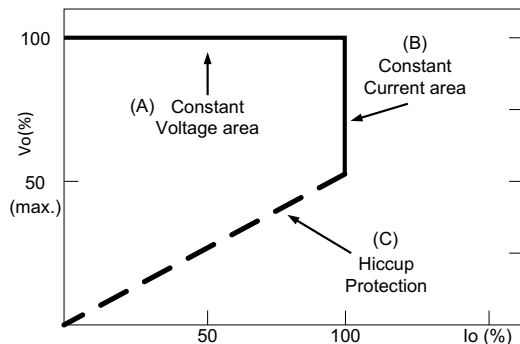


**DRIVING METHODS OF LED MODULE**

There are two major kinds of LED drive method "direct drive" and "with LED driver".

A typical LED power supply may either work in "constant voltage mode (CV) or constant current mode (CC)" to drive the LEDs.

Mean Well's LED power supply with CV+ CC characteristic can be operated at both CV mode [with LED driver, at area (A)] and CC mode [direct drive, at area (B)].



Typical LED power supply I-V curve

MODEL : PLP-60-12

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 : 4.5 Vp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 2.9 Vp-p (Max)	P
2	CURRENT ADJUST RANGE	CH1 : 3.75 A ~ 5 A	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	1.83 A~ 5.3 A/ 230 VAC 1.74 A~ 5.43 A/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 10 %~ -10 % (Max)	I/P : 100 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 1.7 %~ -1.7 %	P
4	LINE REGULATION	V1 : 3 %~ -3 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.6 %~ -0.6 %	P
5	LOAD REGULATION	V1 : 5 %~ -5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 1 %~ -1 %	P
6	SET UP TIME	230VAC : 1000 ms (Max) 115VAC : 2000 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 768 ms 115VAC/ 1536 ms	P
7	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 10 %	P

### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C  I/P : LOW-LINE -3V= 87V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN ( AC POWER ON/OFF NO DAMAGE )	79 V~264V  TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 100VAC ~ 264 VAC O/P : FULL -MIN LOAD Ta : 25°C	TEST : OK	P
3	POWER FACTOR	0.9 / 230 VAC(TYP) 0.9 / 115 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC O/P : 75%-100% LOAD Ta : 25°C	0.926 /230VAC@full load 0.99 /115VAC@full load 0.918 /230VAC@75% load 0.986 /115VAC@75% load	P
4	EFFICIENCY	84 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	84.2 %	P
5	INPUT CURRENT	230V/ 0.4 A (TYP) 115V/ 0.8 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.33 A/ 230 VAC I = 0.637 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 42 A (TYP)  COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 30 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 0.75 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.32 mA N-FG : 0.32 mA	P

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	100 %~ 110 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	103.6 %/ 230 VAC 106 %/ 115 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 15- 18 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	15.3 V/ 230 VAC 15.3 V/ 115 VAC Shut down Re- power ON	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 : PLP-60-24 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 28.2 °C 2. HIGH AMBIENT BURN-IN : 13 HRS I/P : 230VAC O/P : FULL LOAD Ta= 57.4 °C			<b>P</b>	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 105 % LOAD Ta : 25°C	TEST : OK	<b>P</b>	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 230 VAC O/P : LED=23V LOAD Ta= -35 °C	TEST : OK	<b>P</b>	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK	<b>P</b>	
5	TEMPERATURE COEFFICIENT	± 0.03 % (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.01 % (0-50°C)	<b>P</b>	
6	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 1 hour in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK	<b>P</b>	

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75 KVAC/min I/P-FG : 1.88 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 4 KVAC/min I/P-FG : 2.256 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 3.92 mA I/P-FG : 4.02 mA O/P-FG : 1.41 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/70%RH	I/P-O/P : 30 GΩ I/P-FG : 30 GΩ O/P-FG : 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	7 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 C	I/P : 230 VAC/50HZ O/P : 100%/75% LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55015 CLASS B	I/P : 230 V(50HZ)/115V(60HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55015 CLASS B	I/P : 230 V(50HZ)/115V(60HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 LIGHT 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 LIGHT INDUSTRY INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N : 1KV L,N-PE : 2KV	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	PLP-60-24 : SUPPOSE C105 IS THE MOST CRITICAL COMPONENT	I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME= 423279.2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 60 °C LIFE TIME= 50064 HRS		P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 583.3K HRS			P



## COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : STP10NK70ZFP 10A/700V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short Ta : 25°C	(1) 638 V (2) 578 V	P
2	Diode Peak Voltage	D 100 Rated : FMEN-2308 30A/80V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short Ta : 25°C	(1) 71.6 V (2) 72 V	P
3	Clamp Diode Peak Voltage	D 2 Rated : HER206 2A/600V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short Ta : 25°C	(1) 564 V (2) 494 V	P
4	Control IC Voltage Test	U1 Rated : PWM L6561D 10.3V-18V	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) 15.48 V (2) 11.62 V (3) 15.48 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/3/20	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2009/6/16	PRODUCT SAMPLE W0904D29	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023