



TEST REPORT: GSM220A15-R7B

220W AC-DC High Reliability Medical Adaptor

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Component Stress Test

■ SAFETY & E.M.C. TEST

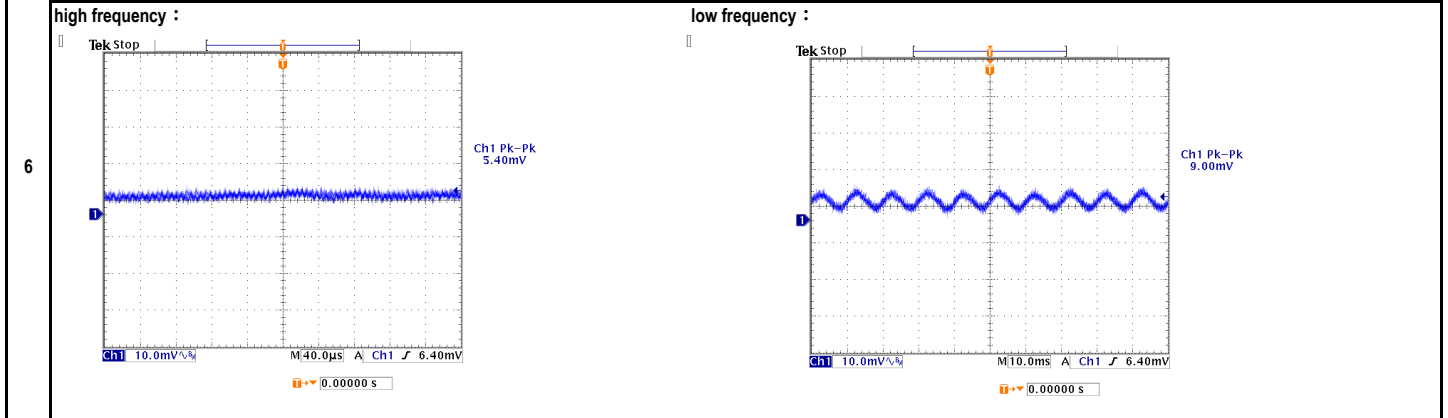
Safety Test
E.M.C. Test

■ RELIABILITY TEST

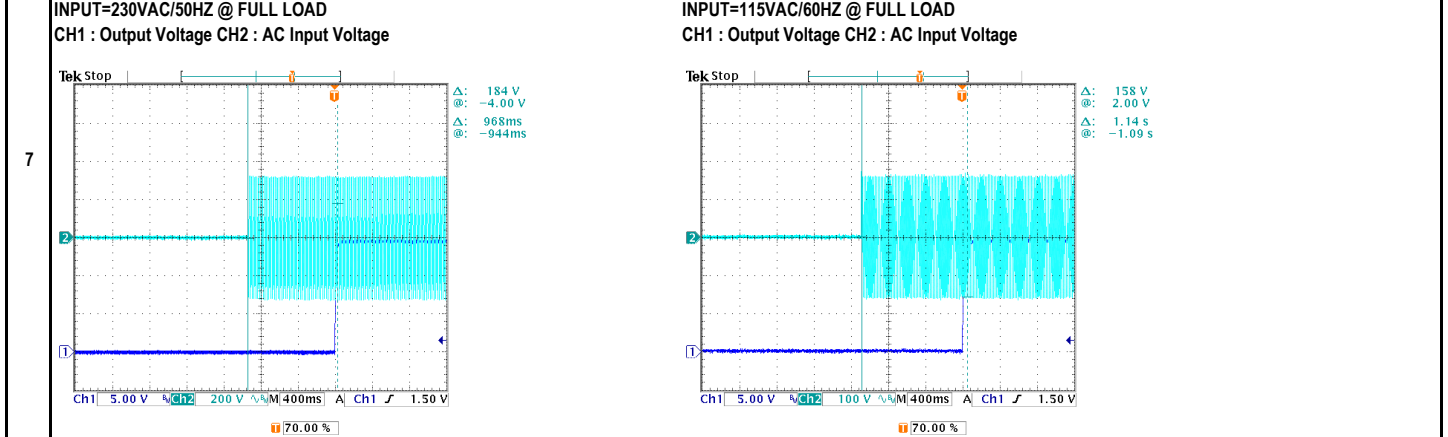
ENVIRONMENT TEST

DESIGN VERIFY TEST
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE RANGE	CH1: 14.25V ~ 15.75V	I/P : 230VAC O/P: MIN LOAD TA: 25°C	CH1: 15.10V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 5.0% ~ -5.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.67% ~ -2.53%
3	LINE REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ -0.07%
4	LOAD REGULATION (MAX.)	V1 : 5.0% ~ -5.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 2.23% ~ -1.02%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 2.8 %
	RIPPLE & NOISE(Max)	V1 : 80 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 9 mVp-p



SET UP TIME (MAX.)	230VAC : 2000ms 115VAC : 2000ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 968ms 115VAC : 1136ms
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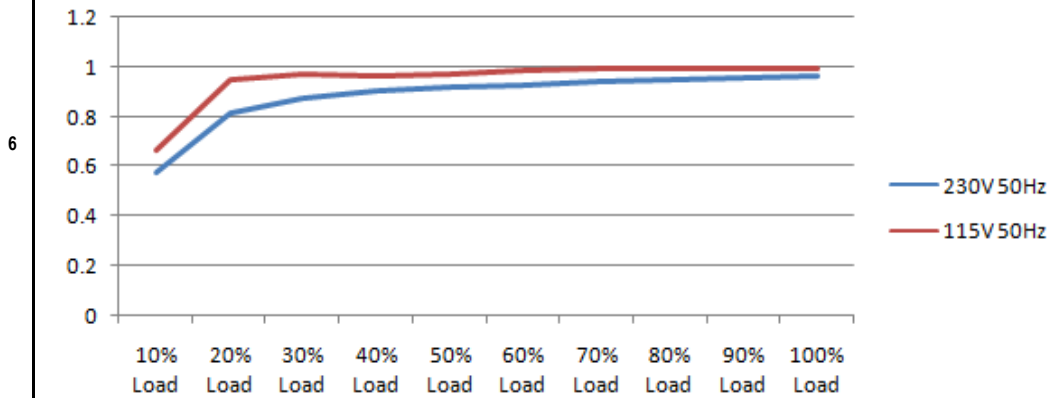


<p>RISE TIME (MAX.)</p>	<p>230VAC : 50ms 115VAC : 50ms</p>	<p>I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C</p>	<p>230VAC : 11.8ms 115VAC : 13.8ms</p>
<p>8</p>	<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>
<p>9</p>	<p>HOLD UP TIME (TYP.)</p>	<p>I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C</p>	<p>230VAC : 24.4ms 115VAC : 24.4ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	
<p>10</p>	<p>DYNAMIC LOAD</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 : 1500 mVp-p</p> <p>V1: (1). 688mv (2). 692mv unit:mVp-p</p>
<p>FULL /Min LOAD 50%DUTY / 120HZ</p>		<p>FULL /Min LOAD 50%DUTY / 1KHZ</p>	

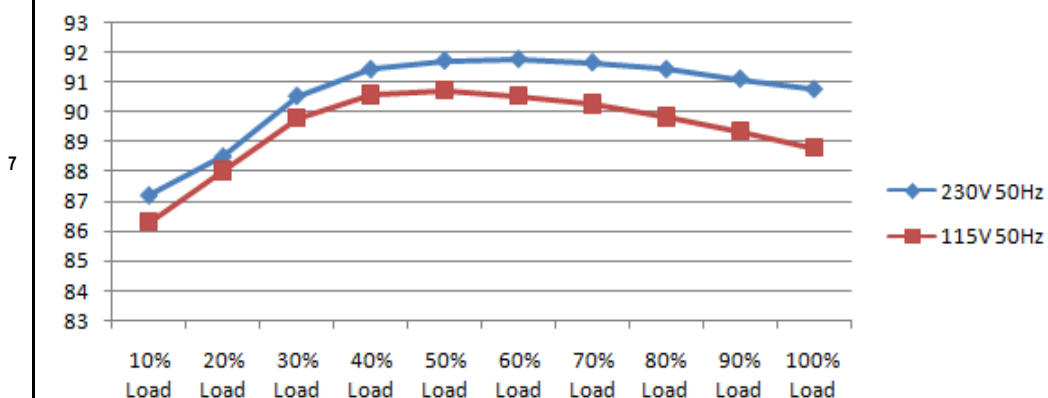


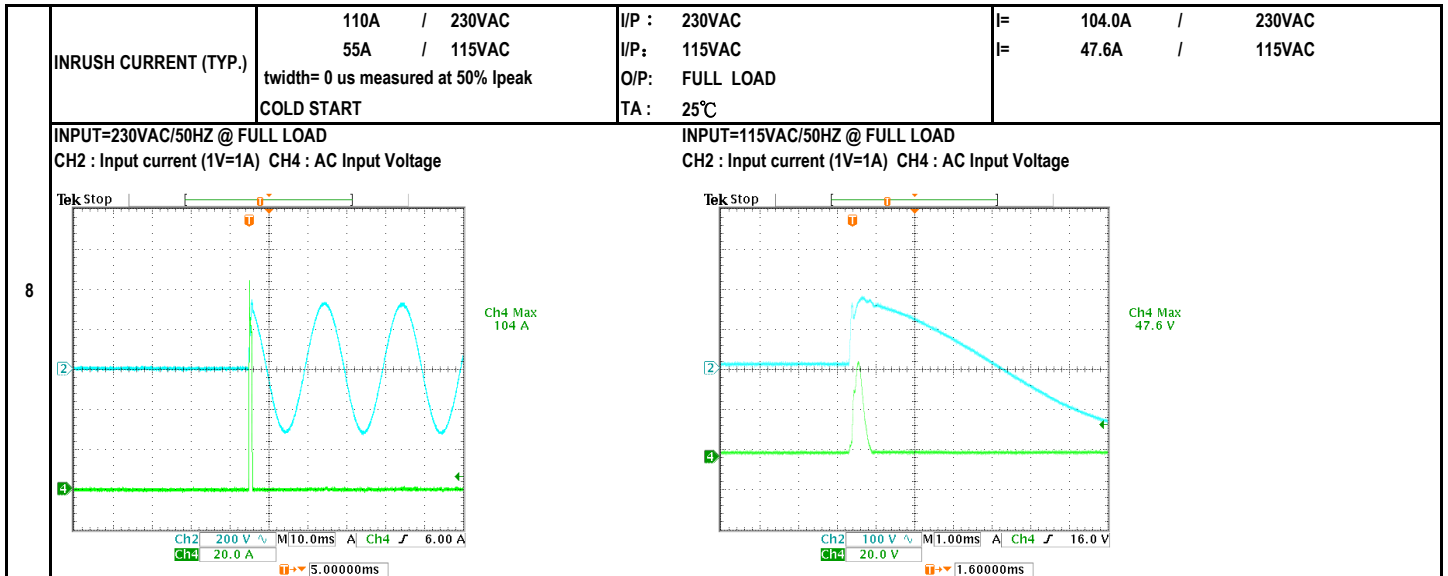
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	62.0VAC ~ 264VAC
			I/P : LOW-LINE = 97VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 100VAC ~ 264VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	2.0A / 230VAC 4.0A / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.9742A / 230VAC I= 0.9937A / 115VAC
4	LEAKAGE CURRENT	< 0.10mA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.053 mA N-FG: 0.051 mA
		< 0.10mA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-V: 0.076 mA N-V: 0.078 mA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.0987 W
	POWER FACTOR (TYP.)	0.91 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.9601 / 230VAC PF= 0.9906 / 115VAC



7	EFFICIENCY (TYP.)	90.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	90.704 %
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PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105% ~ 135%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING TA : 25°C	121% 264VAC 121% 230VAC 121% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	15.75V ~ 20.25V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25°C	18.50V 264VAC 18.50V 230VAC 18.50V 80VAC Hiccup Mode
3	OVER TEMPERATURE PROTECTION	Shut down o/p voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p voltage, recovers automatically after temperature goes down
4	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

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q5 Rated : 600V 18.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q5 Q6 VIN: 267VAC 267VAC (1). 506.00V 480.00V (2). 512.00V 528.00V (3). 458.00V 454.00V
		Q6 Rated : 600V 18.0A		Q101 Rated : 60V 75A
2	O/P Diode (MOSFET)	Q101 Rated : 60V 75A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue (4)Burst mode Ta : 25°C	Q101 Q102 VDS : VDS : VDS : O/P : (1)Full Load Turn on (1). 36.20V 37.40V (2) Output Short (2). 12.40V 12.60V (3)Full load continue (3). 35.90V 37.20V (4)Burst mode (4). 37.00V 36.40V
		Q102 Rated : 60V 75A		C5 Rated : 220uf 450V



4	Control IC	U1	Rated :	38V	(max)	I/P :	267VAC	U1	U101	
				-0.4V	(min)	O/P :	(1)Full Load (2)Output Short (3)O.L.P (4)O.V.P (5)Low Line No Load Vo(min)	(1).	26.70V	11.60V
		U101	Rated :	26V	(max)			(2).	20.20V	1.04V
				-0.3V	(min)			(3).	24.90V	10.70V
						Ta :	25°C	(4).	30.70V	15.80V
								(5).	25.70V	12.90V
5	PFC Power Transistor	Q1	Rated :	600V	15.8A	I/P :	267VAC	Q1	Q2	
						VDS :		VIN:	267VAC	267VAC
						O/P :	(1)Full Load Turn on (2) Output Short (3)Full load continue	(1).	512.00V	510.00V
		Q2	Rated :	600V	15.8A			(2).	508.00V	508.00V
						Ta :	25°C	(3).	492.00V	500.00V
6	PFC Diode	D2	Rated :	600V	15.0A	I/P :	267VAC	D2		
						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	(1).	462.00V	
								(2).	460.00V	
						Ta :	25°C	(3).	460.00V	
								(4).	466.00V	

SAFETY & E.M.C. TEST
SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 4.000KVAC /min I/P-FG : 2.000KVAC /min O/P-FG : 0.500KVAC /min	I/P-O/P: 4.400KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 0.600KVAC /min Ta : 25°C	I/P-O/P: 1.54mA I/P-FG: 1.03mA O/P-FG: 2.05mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P: 500VDC Ta : 25°C/70%RH	I/P-O/P: 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	EN55011 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55011 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 MEDICAL AIR: 8KV / Contact: 6KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 MEDICAL INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 MEDICAL L-N:1KV;L/N-PE: 2KV	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 : GSM220A12-R7B			
		1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 18.0°C			
		2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 41.7°C			
			NO. Position ROOM AMBIENT 18.0°C HIGH AMBIENT Ta: 41.7°C		
			1 LF1 48.0°C 91.3°C		
			2 LF2 46.7°C 94.1°C		
			3 L2 50.5°C 99.1°C		
			4 BD1 52.0°C 99.0°C		
			5 L1 51.1°C 95.1°C		
			6 Q1 50.9°C 95.7°C		
			7 Q2 52.1°C 95.3°C		
			8 D2 53.2°C 95.7°C		
			9 C5 55.3°C 92.7°C		
			10 TSW1 51.1°C 85.1°C		
			11 C83 58.0°C 93.0°C		
			12 RTH2 54.5°C 88.8°C		
			13 T1 COIL 77.9°C 107.8°C		
			14 C109 67.7°C 96.6°C		
			15 Q102 68.7°C 98.6°C		
			16 Q101 69.5°C 98.6°C		
			17 LF101 82.4°C 110.6°C		
	18 Q5 54.5°C 92.6°C				
	19 Q6 54.4°C 90.5°C				
	20 U1 63.2°C 98.1°C				
	21 D3 50.4°C 92.2°C				
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 116.66% LOAD Ta : 25°C	TEST : OK	
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 100VAC O/P : FULL LOAD Ta : -30.0°C	TEST : OK	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 40°C HUMIDITY= 95.0% RH	TEST : OK	
5	TEMPERATURE COEFFICIENT	±0.03% /(0°C~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0109% /(0°C~50°C)	
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C ~ +85°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC		TEST : OK	
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +45°C 2. Temperature change rate : 25°C / 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		TEST : OK	
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°C		TEST : OK	
9	CAPACITOR LIFE CYCLE	:SUPPOSE C109 IS THE MOST CRITICAL COMPONENT	(1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 40.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40.0°C LIFE TIME	(1). 72386.2 HRS (2). 17808.6 HRS (3). 80698.5 HRS (4). 160843.8 HRS	



10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 208.66 KHRS
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 40°C

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014