

■Electrical Characteristics

•R5402N149KD

Unless otherwise provided, T_{opt}=25°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating Input Voltage	V _{DD1}	V _{DD} - V _{SS}	1.5		5.0	V
Minimum Operating Voltage for 0V Charging	V _{st}	Voltage Defined as V _{DD} -V ₋ , V _{DD} -V _{SS} =0V			1.8	V
Over-charge Threshold Voltage	V _{DET1}	R1=330Ω R1=330Ω, T _{opt} =-5°C to 55°C *Note	4.255 4.250	4.280	4.305 4.310	V V
Released voltage from Over-charge	V _{REL1}	R1=330Ω	4.030	4.080	4.130	V
Output Delay of Over-charge	t _{VDET1}	V _{DD} =3.6V→4.4V	0.7	1.0	1.3	s
Release Delay for VD1	t _{VREL1}	V _{DD} =4.5V→3.6V	11	16	21	ms
Over-discharge Threshold	V _{DET2}	Detect falling edge of supply voltage	2.827	2.900	2.973	V
Released Voltage from Over-discharge	V _{REL2}	Detect rising edge of supply voltage	3.022	3.100	3.178	V
Output Delay of Over-discharge	t _{VDET2}	V _{DD} =3.6V→2.2V	14	20	26	ms
Release Delay for VD2	t _{VREL2}	V _{DD} =3V, V ₋ =3V→0V	0.7	1.2	1.7	ms
Excess discharge-current threshold	V _{DET3}	Detect rising edge of 'V-' pin voltage	0.110	0.125	0.140	V
Output delay of excess discharge-current	t _{VDET3}	V _{DD} =3.0V, V ₋ =0V to 1V	8	12	16	ms
Output delay of release from excess discharge-current	t _{VREL3}	V _{DD} =3.0V, V ₋ =3V to 0V	0.7	1.2	1.7	ms
Short Protection Voltage	V _{short}	V _{DD} =3.0V	0.55	0.80	1.00	V
Delay Time for Short Protection	t _{short}	V _{DD} =3.0V, V ₋ =0V to 3V	230	300	500	μs
Reset Resistance for Excess Current Protection	R _{short}	V _{DD} =3.6V, V ₋ =1.0V	25	50	75	kΩ
Excess charge-current threshold	V _{DET4}	Detect falling edge of 'V-' pin voltage	-0.130	-0.100	-0.070	V
Output delay of excess charge-current	t _{VDET4}	V _{DD} =3.0V, V ₋ =0V to -1V	5	8	11	ms
Output delay of release from excess charge-current	t _{VREL4}	V _{DD} =3.0V, V ₋ =-1V to 0V	0.7	1.2	1.7	ms
Delay Time Shortening Mode Voltage	V _{DS}	V _{DD} =4.4V	-1.4	-2.0	-2.6	V
Nch ON-Voltage of COUT	V _{OL1}	I _{ol} =50μA, V _{DD} =4.5V		0.4	0.5	V
Pch ON-Voltage of COUT	V _{OH1}	I _{oh} =-50μA, V _{DD} =3.9V	3.4	3.7		V
Nch ON-Voltage of DOUT	V _{OL2}	I _{ol} =50μA, V _{DD} =2.0V		0.2	0.5	V
Pch ON-Voltage of DOUT	V _{OH2}	I _{oh} =-50μA, V _{DD} =3.9V	3.4	3.7		V
Supply Current	I _{DD}	V _{DD} =3.9V, V ₋ =0V		4.0	8.0	μA
Standby Current	I _{standby}	V _{DD} =2.0V		1.2	2.0	μA

• Note: Considering of variation in process parameters, we compensate for this characteristic related to temperature by laser-trim, however, this specification is guaranteed by design, not mass production tested.

Test Report

No. 2146818/TY

Date : May 10 2007

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RICOH COMPANY LTD
13-1 HIMEMURO -CHO
IKEDA-CITY OSAKA 563-8501
JAPAN

The following sample was submitted and identified by the client as POWER MANAGEMENT ICS.

SGS Job No.
Style / Item No.

- 2358942
1. R1151NXXXX-TR-FX
 2. R1218NXXXX-TR-FX
 3. R5105NXXXX-TR-FX
 4. R5106NXX1X-TR-FX
 5. R5323NXXXX-TR-FX
 6. R5325NXXXX-TR-FX
 7. R5326NXXXX-TR-FX
 8. R5402NXXXX-TR-FX
 9. R5405NXXXX-TR-FX
 10. R5420NXXXX-TR-FX
 11. R5421NXXXX-TR-FX
 12. R5426NXXXX-TR-FX
 13. R5429NXXXX-TR-FX
 14. R5460NXXXX-TR-FX

Manufacturer
Country of Origin
Sample Receiving Date
Testing Period

RICOH COMPANY LTD
JAPAN
MAY 03 2007
MAY 03 - 09 2007

Test Requested : With reference to RoHS Directive 2002/95/EC, and its amendment directives

Test Method : With reference to IEC 62321 (Ed. 1) 111/54/CDV
Procedures for the Determination of Levels of Regulated Substances in
Electrotechnical Products by Chemical Method

- Determination of Lead & Cadmium by ICP/ AAS
- Determination of Mercury by ICP/ CV-AAS
- Determination of Hexavalent Chromium by Colorimetric Method
- Determination of PBB and PBDE by GC/MS

Test Results : Please refer to next page.

Conclusion : Based on the performed tests on submitted samples, the results comply with the
RoHS Directive 2002/95/EC and its subsequent amendments.

Signed for and on behalf of
SGS Hong Kong Ltd.

Wong Tak Ming, William
Operations Manager

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Test results (Unit: mg/kg) :

	1	MDL	RoHS Limit
Cadmium(Cd)	ND	5	100
Lead (Pb)	ND	5	1000
Mercury (Hg)	ND	5	1000
Hexavalent Chromium (CrVI) by alkaline extraction	ND	5	1000
Polybrominated Biphenyl (PBBs)			
Monobromobiphenyl	< 50	50	1000
Dibromobiphenyl	ND	5	-
Tribromobiphenyl	ND	5	-
Tetrabromobiphenyl	ND	5	-
Hexabromobiphenyl	ND	5	-
Pentabromobiphenyl	ND	5	-
Heptabromobiphenyl	ND	5	-
Octabromobiphenyl	ND	5	-
Nonabromobiphenyl	ND	5	-
Decabromobiphenyl	ND	5	-
Polybrominated Diphenylethers (PBDEs)*			
Monobromodiphenyl ether	< 45	45	1000
Dibromodiphenyl ether	ND	5	-
Tribromodiphenyl ether	ND	5	-
Tetrabromodiphenyl ether	ND	5	-
Pentabromodiphenyl ether	ND	5	-
Hexabromodiphenyl ether	ND	5	-
Heptabromodiphenyl ether	ND	5	-
Octabromodiphenyl ether	ND	5	-
Nonabromodiphenyl ether	ND	5	-
Decabromodiphenyl ether*	ND	5	-
Sum of PBDEs (Mono to Deca)	< 50	50	-

Sample Description:

1. Black Ceramic w/ Silvery Metal (Foot)

Note :

- (1) mg/kg = ppm
- (2) ND = Not Detected
- (3) MDL = Method Detection Limit
- (4) < = Less Than
- (5) * = sum of Mono to NonaBDE & according to 2005/717/EC DecaBDE is exempt.
- (6) - = Not Regulated
- (7) The maximum permissible limit is quoted from the document 2005/618/EC amending RoHS directive 2002/95/EC.

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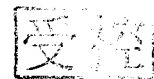
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Delay Time for Short Protection	t _{short}	V _{DD} =3.0V, V ₋ =0V to 3V	230	300	500	μs
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Delay Time Shortening Mode Voltage	V _{DS}	V _{DD} =4.4V	-1.4	-2.0	-2.6	V
Nch ON-Voltage of C _{OUT}	V _{OL1}	I _{ol} =50μA, V _{DD} =4.5V		0.4	0.5	V
Pch ON-Voltage of C _{OUT}	V _{OH1}	I _{oh} =-50μA, V _{DD} =3.9V	3.4	3.7		V
Nch ON-Voltage of D _{OUT}	V _{OL2}	I _{ol} =50μA, V _{DD} =2.0V		0.2	0.5	V
Pch ON-Voltage of D _{OUT}	V _{OH2}	I _{oh} =-50μA, V _{DD} =3.9V	3.4	3.7		V
Supply Current	I _{DD}	V _{DD} =3.9V, V ₋ =0V		4.0	8.0	μA
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