

Laboratory Tata Power Strategic Engineering Division, A Division of the Tata Power Company Ltd., 42-43 Electronic City, Phase 1, Hosur Road, Bengaluru, Karnataka

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-5228 (in lieu of T-2399)

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Validity 13.12.2016 to 12.12.2018

Last Amended on 15.12.2016

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
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ELECTRONICS TESTING

I.	EMC TEST FACILITY			
1.	Military Products/ Electrical/ Electronics Equipment System/ Subsystem/ Vehicle Mounted Systems	Conducted Emission Power Leads	CE01 - MIL 461C, MIL 462	30 Hz to 15 kHz 50 Hz & 400 Hz Single Phase:- Upto 16 A Three phase:- Upto 32 A Upto 50 A DC
			CE03 - MIL 461C, MIL 462	30 Hz to 50 kHz 50 Hz & 400 Hz Single Phase:- Upto 16 A Three phase:- Upto 32 A Upto 50 A DC
			CE101- MIL 461D,E, F & G MIL 462D	30 Hz to 10 kHz 50 Hz & 400 Hz Single Phase:- Upto 16 A Three phase:- Upto 32 A Upto 50 A DC
			CE102- MIL 461D,E, F & G MIL 462D	30 Hz to 10 kHz 50 Hz & 400 Hz Single Phase:- Upto 16 A Three phase:- Upto 32 A Upto 50 A DC
		Conducted Emission Antenna Terminal	CE06 - MIL 461C MIL 462	10 kHz to 12.4 GHz Upto 500 W
			CE106 – MIL 461D,E,F & G MIL 462D	10 kHz to 40 GHz Upto 500 W
		Conducted Susceptibility Power Leads	CS01 – MIL 461C, MIL 462 CS101- MIL 461D,E,F & G MIL 462D	30 Hz to 50 kHz 50 Hz & 400 Hz Single Phase:- Upto 16 A Three phase:- Upto 32 A

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		Conducted Susceptibility Power & interconnection leads	CS02 – MIL 461C, MIL 462	10 kHz to 400 MHz Upto 50 A DC
		Conducted Susceptibility Inter modulation	CS03 – MIL 461C, MIL 462	15 kHz to 10 GHz
			CS103- MIL 461D,E,F & G MIL 462D	15 kHz to 10 GHz
		Conducted Susceptibility Rejection of undesired signals	CS04 – MIL 461C, MIL 462	30 Hz to 20 GHz
			CS104- MIL 461D,E,F & G MIL 462D	30 Hz to 20 GHz
		Conducted Susceptibility Cross modulation	CS05 – MIL 461C, MIL 462	30 Hz to 20 GHz
			CS105- MIL 461D,E,F & G MIL 462D	30 Hz to 20 GHz
		Conducted Susceptibility Spikes, power leads	CS06 - MIL 461C, MIL 462	Up to 400 V at 0.15/5/10 μ S
			CS106- MIL 461 F	Up to 400 V 1.5/5/<20 μ S
		Conducted Susceptibility Structure Current	CS09 – MIL 461C, MIL 462	60 Hz to 100 kHz
			CS109 – MIL 461D,E,F & G MIL 462D	60 Hz to 100 kHz
		Conducted Susceptibility Bulk cable injection	CS114- MIL 461 D,E & F,G # MIL 462D	10 kHz to 400 MHz
		Conducted Susceptibility Bulk cable injection, impulse excitation	CS115- MIL 461 D,E,F & G MIL 462D	Upto 5 A peak amplitude

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		Conducted Susceptibility Damped sinusoidal Transients, Cables & power Leads	CS116 – MIL 461 D,E,F & G MIL 462D	10 kHz to 100MHz 0.1A to 10A
		Radiated Emission Magnetic field	RE01- MIL 461C, MIL 462	30 Hz to 50 kHz
			RE101- MIL 461 D,E, F & G MIL 462D	30 Hz to 100 kHz
		Radiated Emission Electric field	RE02- MIL 461C, MIL 462	14 kHz to 10 GHz
			RE102- MIL 461 D,E,F & G MIL 462D	10 kHz to 18 GHz
		Radiated Emission Antenna Spurious	RE 03 - MIL 461C, MIL 462	10 kHz to 40GHz
			RE 103 – MIL 461 C,D,E F& G MIL 462D	
		Radiated Susceptibility Magnetic Field	RS01- MIL 461C, MIL 462	30 Hz to 50 kHz 50 dBPT to180 dBPT
			RS101- MIL 461 D,E,F & G MIL 462D	30 Hz to 100 kHz 50 dBPT to180 dBPT
		Radiated Susceptibility Magnetic &Electric Field- Spikes	RS02- MIL 461C, MIL 462	Upto 200 V, 1.5/5/10 us Pulse width
		Radiated Susceptibility Electric Field	RS03- MIL 461C, MIL 462	10 kHz to 40 GHz Upto 200V/m
			RS103- MIL 461 D,E,F MIL 462D	10 kHz to 40 GHz Upto 200V/m
			RS103 MIL 461G	2 MHz to 40 GHz Upto 200V/m

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		Radiated Susceptibility	RS05- MIL 461C, MIL 462	Upto 50 kV/m
		Transient Electromagnetic Field	RS105- MIL 461 D,E,F & G, MIL 462D	Upto 50 kV/m
		Shielding Effectiveness	IEEE 299: 2009 IEEE 299-1: 2013 MIL STD 188:125-2	9 kHz to 40 GHz
		Normal Steady state limits for voltage	MIL 704-F – LDC: 2004	Upto 28 V DC
		Total Ripple	MIL 704-F – LDC: 2004	Upto 28 V DC
		Power Failure	MIL 704-F – LDC: 2004	Upto 28 V DC
		Abnormal Steady state Voltage	MIL 704-F LDC: 2004	Upto 28 V DC
		Emergency Steady state Voltage		
		Phase Reversal		
		Radiated Susceptibility Electric Field	DO160 E: 2004 DO160 G: 2010 (Section 20)	100 MHz to 18 GHz, 200 V/m Category S, T, W Except for SW
		Conducted Susceptibility		10 kHz to 400 MHz Category M, R, S, T Except for SW
		Radiated Emissions	DO160 E: 2004 DO160 G: 2010 (Section 21)	2 MHz to 6 GHz Cat B, L, M, H, P & Q
		Conducted Emissions		150 kHz to 152 MHz Cat B, L, M, H, P & Q
		Electrostatic Discharge	DO160 E: 2004 DO160 G: 2010 (Section 25)	(±)15 kV Contact / Air Discharge

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Radiated Emission Test	IEC 61000-6-3 (Edition 2.1) (2011-02) IEC 61000-6-4 (Edition 2.1) (2011-02) IEC 62040-2 (Edition 2.0) (2005-10)	Qualitative
2.	IT Products / Domestic/ Industrial Automation / Scientific / Optronics / Medical / Automotive / Telecom / Consumer / Household / Machinery / Test & Measurement / Laboratory / Locomotive / RF Products / Wireless Products	Radiated Emission Test	IEC 60571- (Edition 3.0) (2012.09) IEC 61326-1 (Edition 1-2005-12) IEC 62236-3-2 (Edition 2.0) (2008.12) IEC 62236-4 (Edition 2.0) (2008.12) IEC 62236-5 (Edition 2.0) (2008.12) CISPR 11: (Edition 5.1) (2010 to 05) CISPR 22 (Edition 6.0) (2008-09) EN 50121-3-2: 2015 EN 50121-4: 2015 EN 50155: 2007 EN 55011: 2009 EN 55014-1: 2006 EN 55022: 2010 EN 62040-2: 2006 EN 61000-6-3: 2011 EN 61000-6-4: 2011	30 MHz to 1 GHz at 3 m distance & 10 m distance 1 GHz to 6 GHz at 3 m distance
		Radiated Disturbance Test	CISPR 14-1 (2011)	30 MHz to 300 MHz (Using absorbing clamp)
		Radiated Emission Test	CISPR 25 (Edition 3.0) (2008-03) CISPR 12: (Edition 6.1) (2009-03)	150 kHz to 2.5 GHz

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			AIS-004 (Part 1): 1999 AIS-004 (Part 3): 2009 ECE R- 10.05 EN 55025: 2008	
		Conducted Emission Test	IEC 61000-6-3 (Edition 2.1) (2011-02) IEC 61000-6-4 (Edition 2.1) (2011-02) IEC 62040-2 (Edition 2.0) (2005-10) IEC 60571 (Edition 3.0) (2012.09) IEC 61326-1 (Edition 1-2005-12) IEC 62236-3-2 (Edition 2.0) (2008.12) IEC 62236-4 (Edition 2.0) (2008.12) IEC 62236-5 (Edition 2.0) (2008.12) CISPR 11 (Edition 5.1) (2010- 05) CISPR 14-1 (Edition 5.2) (2011-11) CISPR 15 (Edition 7-1)2007 CISPR 22 (Edition 6.0) (2008-09) CISPR 25 (Edition 3.0) (2008-03) EN 55025: 2008 ECE R- 10.05 EN 55014-1: 2006/ EN 55022: 2010/AC: 2011	9 kHz to 30 MHz 16 A for Single Phase 32 A for Three Phase 150 kHz to 108 MHz

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			EN 62040-2: 2006 EN 61000-6-3: 2011 EN 61000-6-4: 2011	
		Electrostatic Discharge Immunity Test	IEC 61000-4-2 (Edition 2.0)(2008-12) IEC 61000-6-1 (Edition 2.0) (2005-03) IEC 61000-6-2 (Edition 2.0) (2005-01) IEC 62040-2 (Edition 2.0) (2005-10) IEC 60571 : (Edition 3.0) (2012.09) IEC 61326-1 (Edition 1-2005-12) IEC 62236-3-2 (Edition 2.0) (2008.12) IEC 62236-4 (Edition 2.0) (2008.12) IEC 62236-5 (Edition 2.0) (2008.12) IEC 61547 (Edition 2.0) (2009.06), CISPR 14-2 (Edition 1.2) (2008-07) CISPR 24 (Edition 2.0) (2010 to 08) EN 50121-3-2: 2015 EN 50121-4: 2015 EN 50121-5: 2015 EN 50155: 2007 ISO 10605 (Edition 2.0) (2008-07) Amd. 1: 2014-04 EN 61000-4-2: 2009 EN 55014-2: 1997 EN 55024: 2010	Contact & Air Discharge (±)1 kV to 30 kV (150 pF/330 Ω) (150 pF/150 Ω) (330 pF/ 2 kΩ)

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			EN 61000-6-1: 2007 EN 61000-6-2: 2005 EN 62040-2: 2006	
		RF Radiated Susceptibility Test	IEC 61000-4-3 (Edition 3.2) (2010 to 04) IEC 61000-6-1 (Edition 2.0) (2005-03) IEC 61000-6-2 (Edition 2.0) (2005-01) IEC 62040-2 (Edition 2.0) (2005-10) IEC 60571: (Edition 3.0) (2012.09) IEC 61326-1 (Edition 1-2005-12) IEC 62236-3-2 (Edition 2.0) (2008.12) IEC 62236-4 (Edition 2.0) (2008.12) IEC 62236-5 (Edition 2.0) (2008.12) IEC 61547 (Edition 2.0) (2009.06) CISPR 14-2 (Edition 1.2) (2008-07) CISPR 24 (Edition 2.0) (2010 to 08) ECE R- 10.05 EN 50121-3-2: 2015 EN 50121-4: 2015	80 MHz to 6000 MHz: 30 V/m at 3 m
		RF Radiated Susceptibility Test	EN 50121-5: 2015 EN 50155: 2007 ISO11451-3 (Edition 2.0) (2007.07) ISO11451-2	80 MHz to 6000 MHz : 30 V/m at 3m 10 kHz to 18 GHz, 200 V/m at 1m

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			(Edition 3.0) (2005.02) ISO11452-2 (Edition 2.0) (2004.11) AIS 004 (Part 3): (2009) Annexure 4&7 EN 61000-4-3: 2006 EN 55014-2: 1997 EN 55024: 2010 EN 61000-6-1: 2007 EN 61000-6-2: 2005 EN 62040-2: 2006	
		Electrical fast transient (EFT) / Burst Immunity Test (EFT)	IEC 61000-4-4 (Edition 3.0) (2012-04) IEC 61000-6-1 (Edition 2.0) (2005-03) IEC 61000-6-2 (Edition 2.0) (2005-01) IEC 62040-2 (Edition 2.0) (2005-10) IEC 60571: (Edition 3.0) (2012.09) IEC 61326-1 Edition 1-2005-12) IEC 62236-3-2 (Edition 2.0) (2008.12) IEC 62236-4 (Edition 2.0) (2008.12) IEC 62236-5 (Edition 2.0) (2008.12) IEC 61547 (Edition 2.0) (2009.06) CISPR 14-2 (Edition 1.2) (2008-07) CISPR 24 (Edition 2.0) (2010 to 08) ECE R- 10.05	0.25 kV to 4.0 kV, Polarity (±) Single Phase: Upto 16 A (using Capacitive Clamp)

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			EN 50121-3-2: 2015 EN 50121-4: 2015 EN 50121-5: 2015 EN 50155: 2007 EN 61000-4-4: 2012 EN 55014-2: 1997 EN 55024: 2010 EN 61000-6-1: 2007 EN 61000-6-2: 2005 EN 62040-2: 2006	
		Surge Immunity Test	IEC 61000-4-5 (Edition 3.0) (2014-05) IEC 61000-6-1 (Edition 2.0) (2005-03) IEC 61000-6-2 (Edition 2.0) (2005-01) IEC 62040-2 (Edition 2.0) (2005-10) IEC 61326-1 (Edition 1-2005-12) IEC 62236-4 (Edition 2.0) (2008.12) IEC 62236-5 (Edition 2.0) (2008.12) IEC 61547 (Edition 2.0) (2009.06) CISPR 14-2 (Edition 1.2) (2008-07) CISPR 24 (Edition 2.0) (2010 to 08) ECE R- 10.05 EN 50121-4: 2015 EN 50121-5: 2015 EN 50155: 2007 EN 61000-4-5: 2014	0.25 kV to 6.0 kV Polarity (±) Single phase: Upto 16 A (Only Power lines)

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			EN 55014-2: 1997 EN 55024: 2010 EN 61000-6-1: 2007 EN 61000-6-2: 2005 EN 62040-2: 2006	
		Conducted RF Susceptibility Test	IEC 61000-4-6 (Edition 4.0) (2013-10) IEC 61000-6-1 (Edition 2.0) (2005-03) IEC 61000-6-2 (Edition 2.0) (2005-01), IEC 62040-2 (Edition 2.0) (2005-10) IEC 60571 : (Edition 3.0) (2012.09) IEC 61326-1 (Edition 1-2005-12) IEC 62236-3-2 (Edition 2.0) (2008.12) IEC 62236-4 (Edition 2.0) (2008.12) IEC 62236-5 (Edition 2.0) (2008.12) IEC 61547 (Edition 2.0) (2009.06) CISPR 14-2 (Edition 1.2) (2008-07) CISPR 24 (Edition 2.0) (2010 to 08) ECE R- 10.05 EN 50121-3-2: 2015 EN 50121-4: 2015 EN 50121-5: 2015 EN 50155: 2007 ISO 11452-4: 2011 ISO 11451-4: 2013 EN 61000-4-6: 2014 EN 55014-2: 1997	150 kHz to 230 MHz Upto 10 Vrms

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			EN 55024: 2010 EN 61000-6-1: 2007 EN 61000-6-2: 2005 EN 62040-2: 2006	
		Power Frequency Magnetic field Immunity test	IEC 61000-4-8 (Edition 2.0) (2009-09) IEC 61000-6-1 (Edition 2.0) (2005-03) IEC 61000-6-2 (Edition 2.0) (2005-01) IEC 61326-1 (Edition 1-2005-12) IEC 62040-2 (Edition 2.0) (2005-10) IEC 62236-4 (Edition 2.0) (2008.12) IEC 62236-5 (Edition 2.0) (2008.12) IEC 61547 (Edition 2.0) (2009.06) CISPR 24 (Edition 2.0) (2010 to 08) ECE R-10.05 EN 50121-4: 2015 EN 50121-5: 2015 EN 61000-4-8: 2010 EN 55024: 2010 EN 61000-6-1: 2007 EN 61000-6-2: 2005 EN 62040-2: 2006	1 A/m to 100 A/m
		Supply Voltage Dips & Interruption Immunity Test	IEC 61000-4-11 (Edition 2.0) (2004-03) IEC 61000-6-1 (Edition 2.0) (2005-03) IEC 61000-6-2 (Edition 2.0)	Single Phase: Upto16 A Upto 80 %

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			(2005-01), IEC 61326-1 (Edition 1) (2005-12) IEC 62040-2 (Edition 2.0) (2005-10) IEC 61547 (Edition 2.0) (2009.06) CISPR 14-2 (Edition 1.2) (2008-07) CISPR 24 (Edition 2.0) (2010 to 08) EN 61000-4-11: 2004 EN 55014-2: 1997 EN 55024: 2010 EN 61000-6-1: 2007 EN 61000-6-2: 2005 EN 62040-2: 2006 IEC 61000-6-3 (Edition 2.1) (2011-02) IEC 62040-2 (Edition 2.0) (2005-10) EN 61000-3-2 EN 61000-6-3: 2007 Amd. 1: 2011 EN 62040-2: 2006	
		Flicker	IEC 61000-3-3 (Edition 4.0) (2014-05) IEC 61000-6-3 (Edition 2.1) (2011-02) EN 61000-3-3: 2007 Amd. 1: 2011	Single Phase Upto16 A 50 Hz/60 Hz
		Ring wave Immunity Test	IEC 61000-4-12 (Edition 2.0) (2006-09) EN 61000-4-12	0.5 kV to 6.0 kV 12 Ω
		Harmonic Immunity	IEC 61000-4-13 (Edition 1.1) (2009-07) EN 61000-4-13	Single Phase: Upto 16 A Frequency 50 Hz/60 Hz

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		Voltage Fluctuation	IEC 61000-4-14 (Edition 1.2) (2009-08) EN 61000-4-14	Single Phase: Upto 16 A Frequency 50 Hz/60 Hz
		Ripple on DC	IEC 61000-4-17 (Edition 1.2) (2009-01) EN 61000-4-17	Single Phase: Upto 16 A
		Harmonic Current emission	IEC 61000-3-2 (Edition 4.0) (2014-05) IEC 61000-6-3 (Edition 2.1) (2011-02) IEC 62040-2 (Edition 2.0) (2005-10) EN 61000-3-2 EN 61000-6-3: 2007 Amd. 1: 2011 EN 62040-2: 2006	Fundamental to 40 th Harmonic Single Phase: Upto 16 A Frequency 50 Hz/60 Hz
II.	ENVIRONMENTAL TEST FACILITY			
1.	Electrical/ Electronic Equipment System/ Subsystem/ Vehicle Mounted Systems	Driving Rain	JSS 55555: 2012 Rev. 03 Test Number 12	250 mm to 1500 mm of Rain Fall (For 1 m ³ of test volume and for 375m3 test volume)
		Driving Rain	IS 9000 (Part 16): (1983) IS 10236 (Part 1):4 (1986)	250 mm to 1500 mm of Rain Fall (For 1m ³ of test volume)
		Dust Test	JSS 55555: 2012 Rev. 03 Test Number 14 IS 9000 (Part12): (1981) IS 10236 (Part13): (1986)	Qualitative (150 microns to 45 microns)
		High Temperature Test	JSS 55555: 2012 Rev. 03 Test Number 17 MIL-STD 810G: 2008 Method 501.5	(-)70°C to (+)180°C 0.1°C/Min to 10°C/Min

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		Dry Heat Test	IS 9000 (Part 3/Sec I to V): (1977) IS 10236 (Part 2): (1982)	(-)70°C to (+)180°C 0.1°C/Min to 10°C/Min
		Low Temperature Test	As per JSS 55555: 2012 Rev. 03, Test Number 20 MIL-STD 810G: 2008 Method 502.5	(-)70°C to (+)180°C 0.1°C/Min to 10°C/Min
		Cold Test	IS 9000 (Part 2/Sec I to IV): (1977) IS 10236 (Part 3): (1982)	(-)70°C to (+)180°C 0.1°C/Min to 10°C/Min
		Damp Heat Test & Tropical Exposure	JSS 55555: 2012 Rev. 03 Test Number 10, 27	(-)70°C to (+)180°C 0.1°C/Min to 10°C/Min RH:10 % to 95 %
		Humidity Test	MIL-STD 810G: 2008 Method 507.5	(-)70°C to (+)180°C 0.1°C/Min to 10°C/Min RH:10 % to 95 %
		Damp Heat Test(Steady State) & (Cyclic)	IS 9000 (Part 4): 2008, (Sec 1 & 2) & 6: 1981 IS 10236 (Part 4,5): 1982	(-)70°C to (+)180°C 0.1°C/Min to 10°C/Min RH:10 % to 95 %
		Altitude Test	JSS 55555: 2012 Rev. 03 Test Number 3	(-)70°C to (+)180°C Ambient to 30 Mbar 0.1°C/Min to 5°C/Min
		Low Pressure (Altitude)	MIL-STD 810G: 2008 Method -500.5	(-)70°C to (+)180°C ambient to 30 mbar, 0.1°C/Min to 5°C/Min
		(Low Pressure & Temperature Test) Combined Cold low air pressure Test	IS 9000 (Part 13): (1981), 31(1978) & IS 10236 (Part 9): (1983)	(-)70°C to (+)180°C ambient to 30 Mbar 0.1°C/Min to 5°C/Min
		Rapid Temperature Cycling	JSS 55555: 2012 Rev. 03 Test Number 22	(-)70°C to (+)180°C 0.1°C/Min to 10°C/Min
		Temperature shock Test	MIL-STD 810G: 2008 Method 503.5	(-)70°C to (+)180°C 0.1°C/Min to 10°C/Min

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Change of Temperature	IS 9000 (Part 14/Sec I) & 2(Cycling)(1988) IS 10236 (Part 8): (1983)	(-)70°C to (+)180°C (±)3°C 0.1°C/Min to 10°C/Min
		Vibration Sinusoidal	JSS 55555: 2012 Rev. 03 Test Number 28 MIL-STD 810G 2008 Method 514.6 and 528 IS 9000 (Part 8): (1981) IS 10236 (Part 11): (1985)	Force rating up to 3500 kGF Displacement 51 mm velocity 1.8 m/s Acceleration 100 G+/-3dB Frequency from 5-2000 Hz+/-1.5dB
		Vibration Random	JSS 55555: 2012 Rev. 03 Test Number 28 MIL-STD 810G Method 514.6 and 528	Force rating up to 3500KGF Displacement 51 mm velocity 1.8 m/s Acceleration 75 G+/-3dB Frequency from (5 to 2000) Hz+/-1.5dB
		Acceleration (Steady State)	JSS 55555: 2012 Rev. 03 Test Number 1	0 to 35 g acceleration, Rate range of 0 to 300 RPM with 1 % per minute of operating rate above 60 RPM.
		Acceleration	MIL-STD 810G: 2008 Method 513.6 IS 9000 (Part 9): (1984)	0 to 35 g acceleration, Rate range of 0 to 300 RPM with 1 % per minute of operating rate above 60 RPM
		Bump	As per JSS 55555: 2012 Test Number 5	Half Sine Up to 40g 3 ms to 16 ms
		Impact Test (Bump)	IS 9000 (Part 7/Sec II): 1979 As per IS 10236 (Part 10): (1985)	Half Sine Up to 40g 3 ms to 16 ms

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Shock or Impact Test	JSS 55555: 2012 Rev. 03 Test Number 24	Half Sine, saw tooth, 5 g to 75 g, 30 ms to 3 ms
		Impact Test	Mil 810G: 2008 Method 516.6	Half Sine, saw tooth 5 g to 75 g, 30 ms to 3 ms
		Shock Test	As per IS 9000 (Part 7/Sec I): (2006)	Half Sine, saw tooth, Upto 40 g 3 ms to 11 ms
			As per IS10236 (Part 12): (1985)	Trapezoidal, 5 g to 50 g 30 ms to 3 ms

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