Data sheet

GEN series
ISOBE5600m

Isolated Transient Recorder

Special features

- **4 analog channels**
- **Isolated, unbalanced differential inputs**
- **± 100 mV to ± 50 V input ranges**
- **ISOBE5600t battery powered**
- **ISOBE5600tm continuous power; 1.8 kV RMS isolation**
- **Digital fiber optic link**
- **Metal BNC inputs**
- **Cost-effective**
- **Analog-in to digital storage**
- **Isolated Transient Recorder**

ISOBE5600m isolated transient recorder:
Offers fiber optic isolation for high speed transient recorder applications. The ISOBE5600m isolated transient recorder consists of a transmitter unit (ISOBE5600t or ISOBE5600tm) connected via fiber optic cable to the ISOBE5600m receiver.
Connected to a PC using a USB 2.0 port, full setup and transient recorder control is to be supported by the proven Perception software. For optional stand alone operation the receiver unit supports front panel controls and one analog output per transmitter.

The ISOBE5600tm offers 1.8 kV RMS continuous powered isolation, while the ISOBE5600t offers higher isolation options using battery power. Using the one battery option, the ISOBE5600t has a 15 hour operation time. Using the optional second battery extends operation time to 30 hours.

Capabilities Overview

Receiver model	ISOBE5600m
Transmitter models	ISOBE5600t and ISOBE5600tm
Maximum sample rate per channel	100 MS/s (ADC and DAC)
ADC resolution	14 bit (ADC and DAC)
Memory per receiver	128 MS (256 MB)
Analog channels	4 outputs per receiver. One output per transmitter 1 input per transmitter
Isolation	Yes; transmitter to receiver and transmitter to earth
Input type	Isolated, unbalanced differential inputs
Probes	Not supported
Sensors	Not supported
TEDS	Not supported
Real-time formula database calculators (option)	Not supported
Real-time formula database calculators (option)	Not supported
EtherCat® output	Not supported
Digital Event/Timer/Counter	Not supported

ISOBE5600 Block Diagram

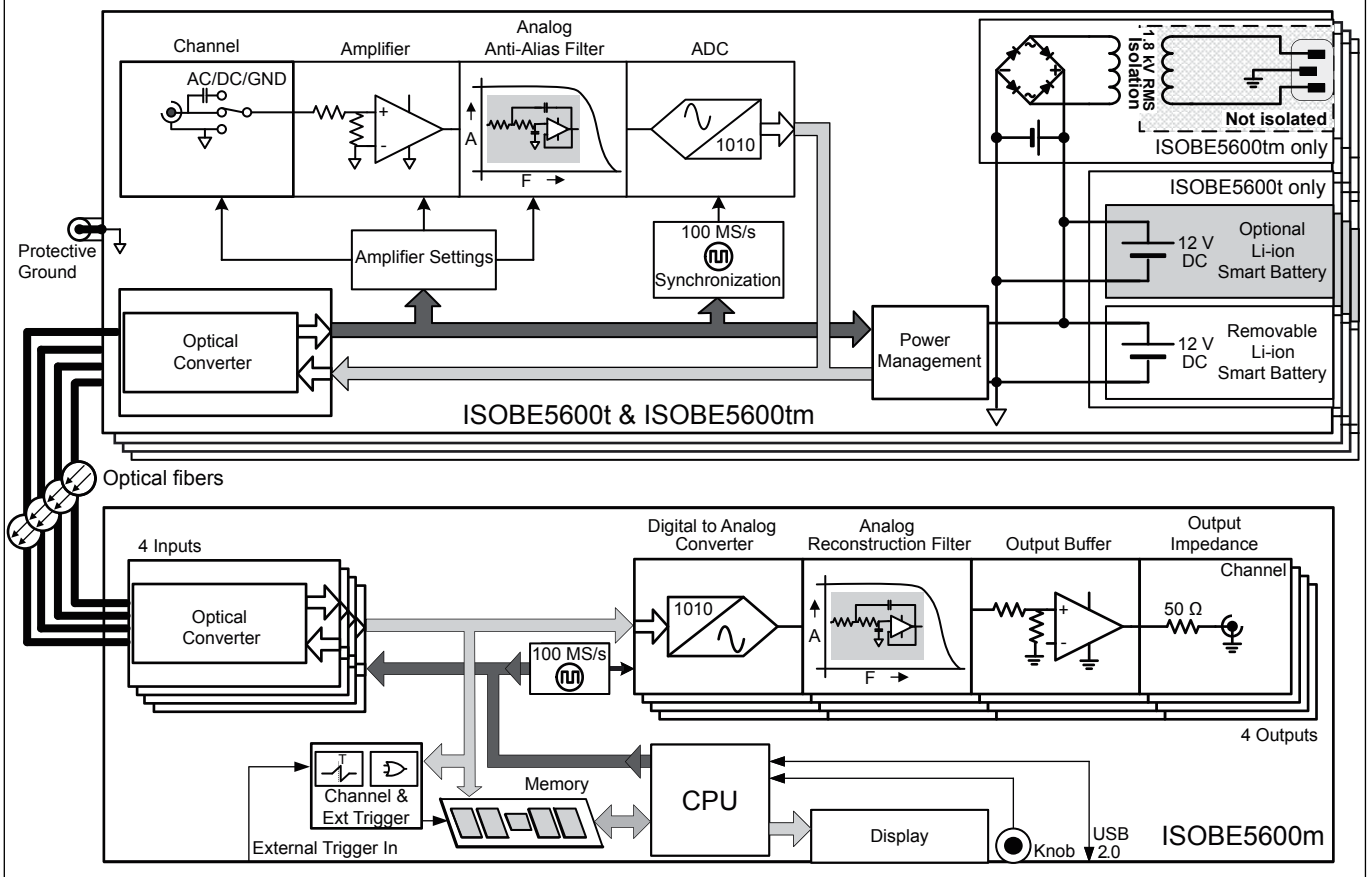


Figure 1.1: Block Diagram ISOBE5600m

Analog Input ISOBE5600t & ISOBE5600tm (Transmitter)	
Channels	1
Connector	1; Metal BNC
Input type	Single-ended to isolated common (unbalanced differential)
Input Coupling	
Coupling modes	AC / DC / GND
AC coupling frequency	1.6 Hz (±10%); - 3 dB

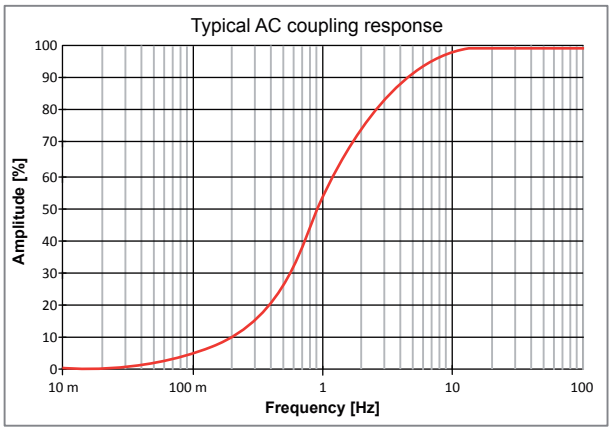


Figure 1.2: Typical AC coupling response

Impedance	1 MΩ (± 2%) // 38 pF (± 5%)
Ranges	± 100 mV, ± 200 mV, ± 500 mV, ± 1 V, ± 2 V, ± 5 V, ± 10 V, ± 20 V and ± 50 V
Range error (DC Offset)	
Wideband	0.1% of Full Scale ± 50 µV
Bessel filter	0.1% of Full Scale ± 50 µV
Offset error drift	ISOBE5600t: ±(60 ppm + 10 µV)/°C (±(36 ppm + 6 µV)/°F) ISOBE5600tm: ±(100 ppm + 10 µV)/°C (±(60 ppm + 6 µV)/°F)
Reading error (DC Gain)	
Wideband	0.1% of reading ± 50 µV
Bessel filter	0.1% of reading ± 50 µV
Gain error drift	ISOBE5600t: ±100 ppm/°C (± 60ppm/°F) ISOBE5600tm: ±(100 ppm + 10 µV)/°C (±(60 ppm + 6 µV)/°F)
RMS Noise (50 Ω terminated)	
Wideband	0.05% of Full Scale ± 100 µV
Bessel filter	0.05% of Full Scale ± 100 µV
Bandwidth	> 25 MHz @ – 3 dB
Anti-alias filter	Lowpass at 10 MHz; ± 1 MHz 6th order Bessel
CMRR	100 dB @ 80 Hz
Input Bias current	< 2 nA
Rise time	14 ns
Input overload protection	
Maximum nondestructive voltage	± 125 V DC; Ranges < ± 2 V ± 250 V DC; Ranges ≥ ± 2 V
Overload recovery time	Restored to 0.1% accuracy in less than 50 ns after 200% overload Restored to 10% accuracy in less than 10 ns after 200% overload

Channel to Channel Phase Match	
Using different filter selections (Wideband or Bessel) will lead to phase mismatches between channels	
Channel to Channel phase difference	Maximum 10 ns; using identical optical cable lengths
Cable length compensation	No
Cable delay	5 ns/m

Triggering	
Channel trigger	1 fully independent per channel
Pre- and post-trigger length	0 to full memory
Trigger rate	1 trigger per recording
Manual trigger (Software)	Supported
External Trigger In	
Selectable (Software)	Rising/Falling edge or Off
Minimum pulse width	500 ns
Trigger in delay	± 1 sample period
Analog channel trigger	
Levels	2 level detectors
Resolution	16 bit (0.0015%); for each level
Direction	Rising/Falling; single direction control for both levels based on selected mode
Hysteresis	Fixed 0.03% of Full Scale (defines the trigger noise sensitivity)
Analog channel trigger modes	
Basic	POS or NEG crossing; single level
Dual level	One POS and one NEG crossing; two individual levels, logical OR

Acquisition Mode	
Single sweep	Triggered acquisition to on-board memory without sample rate limitations; for single transients or intermittent phenomena. No aggregate sample rate limitations.
Maximum sweep memory	32 MS/channel
Maximum sweep sample rate	100 MS/s
Pre-trigger segment	0% to 100% of selected sweep length If trigger occurs before pre-trigger segment is recorded, pre-trigger segment is truncated to recorded data only
Sweep stretch	Not supported

Fiber Optic Link	
Light source	Class 1 laser product
Transfer rate	2 Gbit/s
Wavelength	850 nm
Connector	LC duplex
Cable	
Isolation	10^{15} Ω/m
Maximum length	50 m (164 ft); using ISO/IEC 11801 type OM2, OM3 or OM4 cable and no extra couplers(1)
Type	Duplex Multi Mode, 50/125 µm, ISO/IEC 11801 type OM2

(1) Other fiber cable lengths can be ordered from custom systems at: customsystems@hbm.com

ISOBE5600 Analog-in to Analog-out	
Bandwidth	20 MHz @ – 3 dB (wideband) 10 MHz @ – 3 dB (filtered)
Pass band flatness (wideband)	± 0.3 dB (± 3.4%); DC to 1 MHz ± 1 dB (± 11%); 1 MHz to 10 MHz
Rise time (wideband)	18 ns
CMRR	100 dB @ 80 Hz
Range error (DC Offset)	0.3% Full Scale ± 50 µV RTI(1)
Noise (RMS)	0.07% Full Scale ± 0.1mV RTI(1)
Non-linearity	± 0.05%
Propagation delay	650 ns ± 50 ns from input to output with 1 meter of optical cable 5 ns per added meter of additional cable length

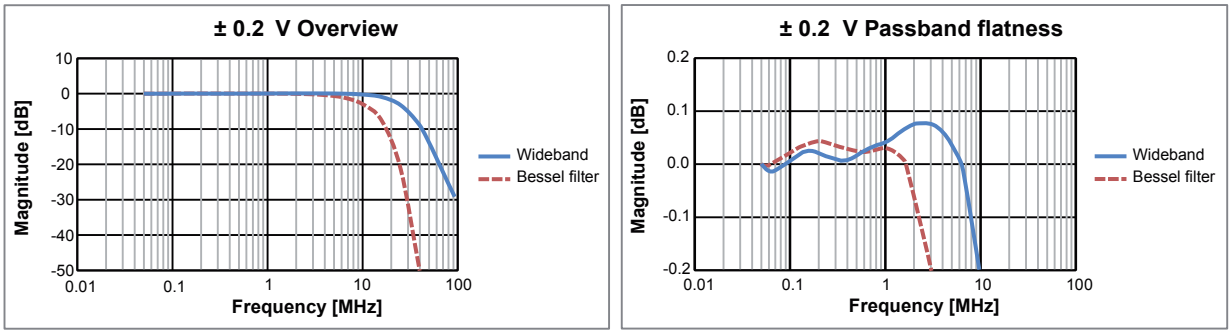


Figure 1.3: Typical ± 0.2 V Overview and passband flatness

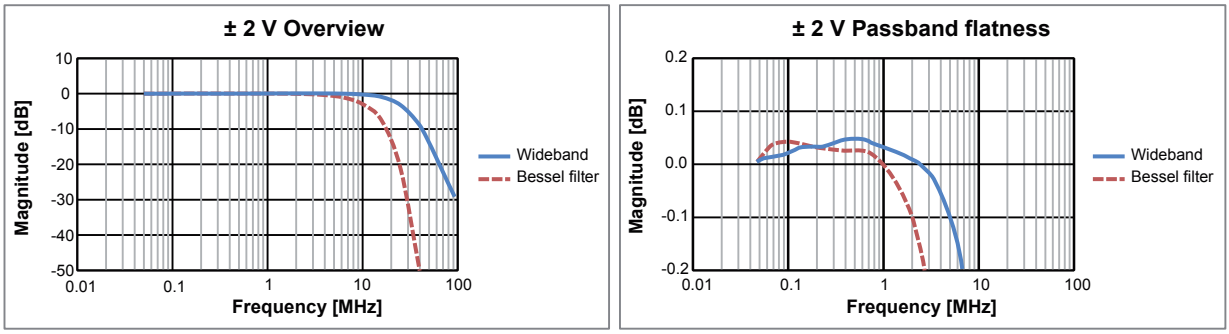


Figure 1.4: Typical ± 2 V Overview and passband flatness

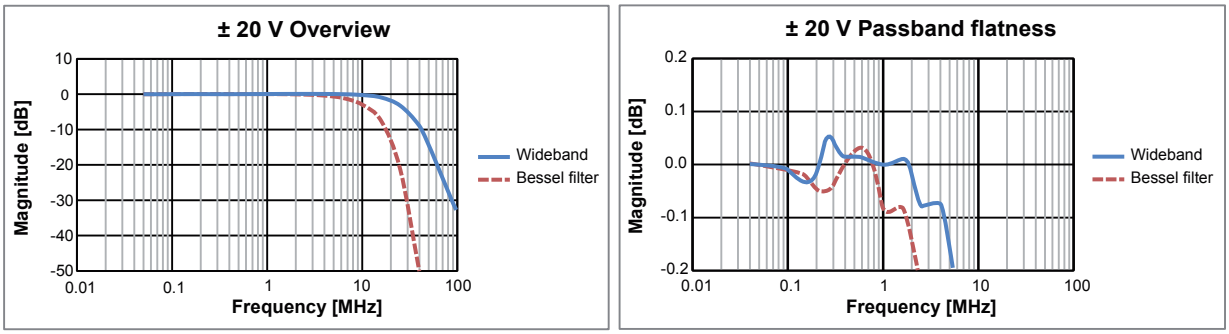


Figure 1.5: Typical ± 20 V Overview and passband flatness

(1) RTI: Referred to Input

Analog Output ISOBE5600m (Receiver)	
Channels	4; 1 per transmitter channel (ISOBE5600t and/or ISOBE5600tm)
Connector	4; Metal BNC, one BNC per channel on receiver front panel
Conversion	100 MS/s DAC (digital to analog converter) per channel
DAC resolution	14 bit (0.006%)
Outputs	
Output filter	Lowpass 40 MHz @ – 3 dB; 6th order Bessel reconstruction filter
Output impedance	50 Ω ± 2%
Calibrated Full Scale output level	± 2 V; 1 MΩ load
Non calibrated Full Scale output level	± 1 V; 50 Ω load (Additional output error: add 1% + 1/2 of the error of load resistor)

Power Requirement (ISOBE5600t)	
Battery powered	Maximum 2 removable batteries possible **Note** *Use HBM approved batteries only. See option G034 for approved battery details.*
Power consumption	6 VA typical, 8 VA maximum
Operation Time (using G034 batteries)	15 hours; 1 battery installed (30 hours; 2 batteries installed)

Power Requirement (ISOBE5600tm)	
Power supply	115/230 V AC @ 47 - 63 Hz (manual voltage selector)
Power consumption	12 VA maximum
Power supply isolation	
Protective ground connected	0 V, both sides grounded
Protective ground not connected	1.8 kV RMS (IEC 61010-1:2010) Requires a protected LAB environment and EN50191:2000 compliant work procedures
Fuse(s)	2 x 250 mA; Slow blow
Battery	12 V @ 300 mAh; Internal, rechargeable, NiMH
Battery back-up time	5 minutes (with new and fully charged battery)

Power Requirement (ISOBE5600m)	
Power supply input	90 - 264 V AC @ 47 - 63 Hz
Power consumption	40 VA maximum
Fuse(s)	2 x 1 A, 5 x 20 mm; Slow blow (T)

Physical, Weight and Dimensions ISOBE5600t	
Weight	4.6 kg (10 lb) including two batteries
Dimensions including handles	175 mm (6.9") x 277 mm (10.9") x 119 mm (4.7") (W x D x H)
Shielding and casing	Single metal shielding in plastic housing. Correct operation has been verified by placing the transmitter cabinet within 1 meter of an EMC field created by a 80 kA current
Cooling Fans	0
Handle	One carrying handle
Protective ground	M6 screw terminal

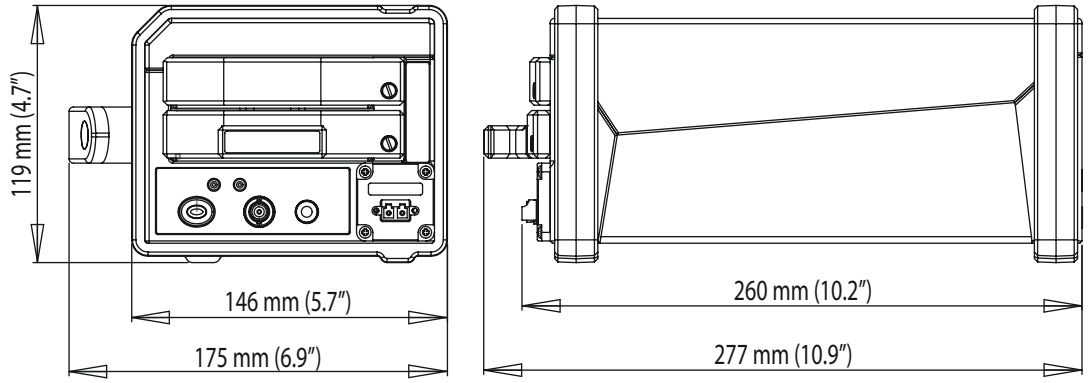


Figure 1.6: Dimensions ISOBE5600t transmitter

Physical, Weight and Dimensions ISOBE5600tm	
Weight	3 kg (6.6 lb)
Dimensions including handles	175 mm (6.9”) x 263 mm (10.4”) x 119 mm (4.7”) (W x D x H)
Shielding and casing	Single metal shielding in plastic housing. Correct operation has been verified by placing the transmitter cabinet within 1 meter of an EMC field created by a 80 kA current
Cooling Fans	1
Handle	One carrying handle
Protective ground	M6 screw terminal

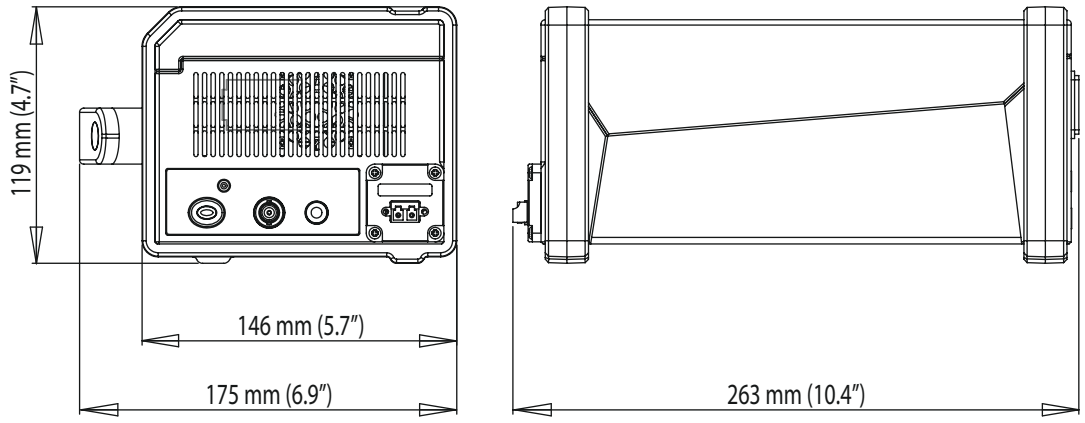


Figure 1.7: Dimensions ISOBE5600tm transmitter

Physical, Weight and Dimensions (ISOBE5600m)	
Weight	1.4 kg (3.0 lb)
Dimensions including handles	221 mm (8.7”) x 271 mm (10.7”) x 91 mm (3.6”) (W x D x H)
Casing	Metal housing with rubber band. Rubber band includes feet and stacking holes.
Cooling Fans	1
Handle	One carrying handle
Protective ground	4 mm Banana plug

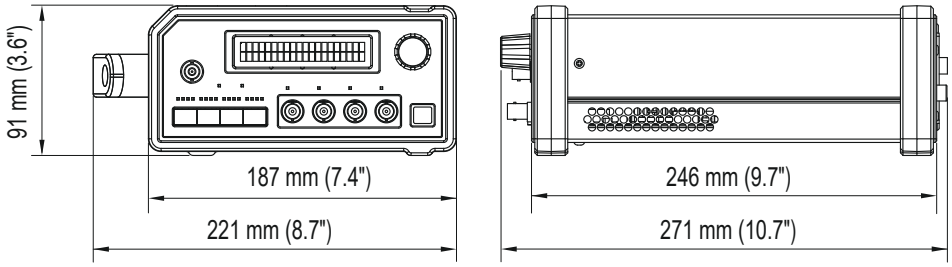


Figure 1.8: Dimensions ISOBE5600r/ISOBE5600m receiver

Environmental Specifications

Temperature Range	
Operational	ISOBE5600t transmitter: -15 °C to +50 °C (+5 °F to +122 °F) ISOBE5600tm transmitter: 0 °C to +40 °C (+32 °F to +104 °F) ISOBE5600m receiver: 0 °C to +40 °C (+32 °F to +104 °F)
Non-operational (Storage)	-25 °C to +70 °C (-13 °F to +158 °F)
Thermal protection	Automatic thermal shutdown at 85 °C (+185 °F) internal temperature Audio user warning notifications on receiver at 75 °C (+167 °F)
Relative humidity	0% to 80%; non-condensing; operational
Protection class	IP20
Altitude	Maximum 2000 m (6562 ft) above sea level; operational
Shock: IEC 60068-2-27	
Operational	Half-sine 10 g/11 ms; 3-axis, 1000 shocks in positive and negative direction
Non-operational	Half-sine 25 g/6 ms; 3-axis, 3 shocks in positive and negative direction
Vibration: IEC 60068-2-64	
Operational	1 g RMS, ½ h; 3-axis, random 5 to 500 Hz
Non-operational	2 g RMS, 1 h; 3-axis, random 5 to 500 Hz
Operational Environmental Tests	
Cold test IEC 60068-2-1 Test Ad	-5 °C (+23 °F) for 2 hours
Dry heat test IEC 60068-2-2 Test Bd	+40 °C (+104 °F) for 2 hours
Damp heat test IEC 60068-2-3 Test Ca	+40 °C (+104 °F), humidity > 93% RH for 4 days
Non-Operational (Storage) Environmental Tests	
Cold test IEC 60068-2-1 Test Ab	-25 °C (-13 °F) for 72 hours
Dry heat test IEC 60068-2-2 Test Bb	+70 °C (+158 °F) humidity < 50% RH for 96 hours
Change of temperature test IEC 60068-2-14 Test Na	-25 °C to +70 °C (-13 °F to +158 °F) 5 cycles, rate 2 to 3 minutes, dwell time 3 hours
Damp heat cyclic test IEC 60068-2-30 Test Db variant 1	+25 °C/+40 °C (+77 °F/+104 °F), humidity >95/90% RH 6 Cycles, cycle duration 24 hours

Harmonized Standards for CE Compliance, According to the Following Directives

Low Voltage Directive (LVD): 2014/35/EU
Electromagnetic Compatibility Directive (EMC): 2014/30/EU

Electrical Safety	
EN 61010-1 (2011)	Safety requirements for electrical equipment for measurement, control, and laboratory use - General requirements
EN 61010-2-030 (2011)	Particular requirements for testing and measuring circuits
Electromagnetic Compatibility	
EN 61326-1 (2013)	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
Emission	
EN 55011	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics. Conducted disturbance: class B; Radiated disturbance: class A
EN 61000-3-2	Limits for harmonic current emissions: class D
EN 61000-3-3	Limitation of voltage changes, voltage fluctuations and flicker in public low voltage supply systems
Immunity	
EN 61000-4-2	Electrostatic discharge immunity test (ESD); contact discharge ± 4 kV/air discharge ± 8 kV: performance criteria B
EN 61000-4-3	Radiated, radio-frequency, electromagnetic field immunity test; 80 MHz to 2.7 GHz using 10 V/m, 1000 Hz AM: performance criteria A
EN 61000-4-4	Electrical fast transient/burst immunity test Mains ± 2 kV using coupling network. Channel ± 2 kV using capacitive clamp: performance criteria B
EN 61000-4-5	Surge immunity test Mains ± 0.5 kV/± 1 kV Line-Line and ± 0.5 kV/± 1 kV/± 2 kV Line-earth
EN 61000-4-6	Immunity to conducted disturbances, induced by radio-frequency fields 150 kHz to 80 MHz, 1000 Hz AM; 10 V RMS @ mains, 10 V RMS @ channel, both using clamp: performance criteria A
EN 61000-4-11	Voltage dips, short interruptions and voltage variations immunity tests Dips: performance criteria A; Interruptions: performance criteria C

G034: Rechargeable Li-ion SM202 Battery (Option, to be ordered separately)

Note *Local regulations don't allow HBM to import batteries to several countries. These regulations change regularly and are increasingly becoming more strict. Check with the local HBM office before ordering the battery from HBM.*
Use only HBM approved batteries to avoid unexpected failures and/or specification deviations.
G034 batteries have almost all world-wide approvals and are available for purchase locally in many countries.
For more information, please refer to the following website: www.rrc-ps.com

Original manufacturers part number	RRC2020
Chemical system	Lithium Ion (Li-Ion)
Nominal voltage	11.25 V
Typical weight	490 g (1.1 lb)
Nominal capacity	8850 mAh
Capacity life expectancy @ 25 °C 4.40 A Charge/ 4.40 A Discharge	>300 cycles with minimum 80% of initial capacity
Mechanical form factor	SM202
Dimensions	149 mm (5.86”) x 89 mm (3.50”) x 19.7 mm (0.77”) (D x W x H)
Smart battery	SMbus & SBDS revision 1.1 Compliant
Maximum charge voltage	13.0 V
Recommended maximum charge current	4.0 A
Typical charging time	3 hours @ charging current of 4 A
Discharge temperature	-20 °C to +55 °C (-4 °F to +131 °F)
Charge temperature	+0 °C to +40 °C (+32 °F to +104 °F)
Storage temperature	-20 °C to +60 °C (-4 °F to +140 °F). Recommended -20 °C to +20 °C (-4 °F to +68 °F)
Original manufacturer's part number	RRC power solutions RRC2020
Compliance information	CE / UL2054 / FCC / PSE / KC / Gost / EAC / CQC / RCM / IEC62133 / UN38.3 / RoHS / REACH / BIS
Availability	Available in most countries worldwide
Recycling	Registered with many recycling systems worldwide

Figure 1.9: G034 Battery

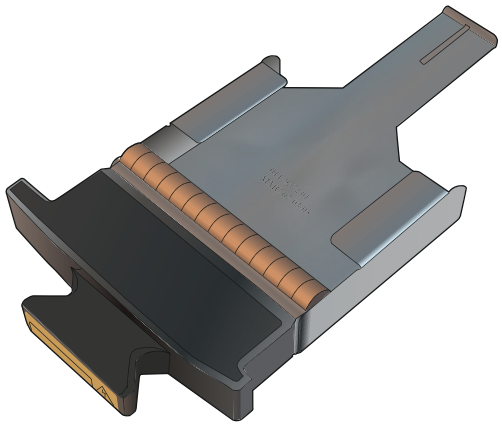


Figure 1.10: G301 Battery carrier

G109: Li-ion Battery Charger (Option, to be ordered separately)

Li-ion two-bay battery charger	
Smart battery support	SmBus Level 3
Maximum charge current	3 A, or limited by smart battery
Battery recalibration	SmBus 1.2 A @ 12 V
Charge strategy	Simultaneous for two batteries.

Figure 1.11: Two-bay Li-ion battery charger

KAB280: Fiber Cable Standard MM LC-LC (option, to be ordered separately)

Standard fiber optic duplex Multi Mode patch cable

Figure 1.12: Block diagram and image

Connector type	LC - LC
Glass rating	OM3; Multi Mode
Core/Cladding diameter	50/125 µm
Jacket size	2 mm (0.08")
Jacket rating	Low-smoke zero-halogen
Attenuation	≤ 2.7 dB/km @ 850 nm
Available lengths	3, 10, 20 and 50 m (10, 33, 66 and 164 ft)
Operating temperature	- 40 °C to +80 °C
Isolation	10^{15} Ω/m

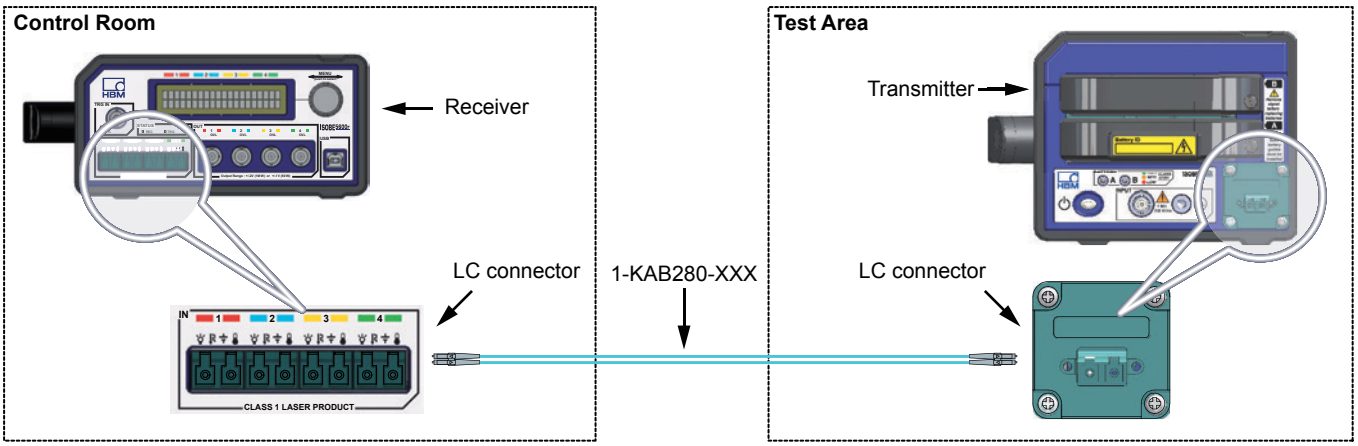
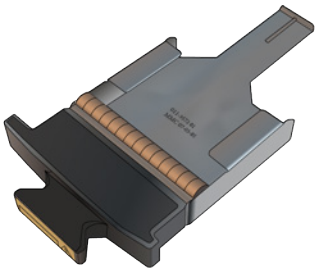


Figure 1.13: Application area of a fiber optic duplex cable (Example 1)

Ordering Information[1]			
Article		**Description**	**Order No.**
ISOBE5600t 1 ch Transmitter		ISOBE5600t transmitter HV, 100 MS/s, 14 bit, 25 MHz, two Li-ion battery holders, LC connector. **Note** *Batteries need to be ordered separately. Check the import restrictions before ordering batteries from HBM. Use only HBM approved batteries to avoid unexpected failures and/or specification deviations.*	1-GENIS-1T
ISOBE5600tm 1 ch Transmitter		ISOBE5600tm transmitter MV, 100 MS/s, 14 bit, 25 MHz, built-in power supply with 1.8 kV RMS isolation, LC connector.	1-GENIS-1TM
ISOBE5600m 4 ch Receiver		ISOBE5600m receiver, 4 channels, 4 x LC in, 4 x BNC out, LCD display for channel setup transient recorder, 32 MB per channel transient memory. Analog bandwidth in transient recorder mode 25 MHz.	1-GENIS-4M

(1) All ISOBE5600 systems are intended for exclusive professional and industrial use.

Accessories, to be ordered separately

Article		Description	Order No.
Li-ion SM202 Battery		Rechargeable Li-ion battery unit for GN110/ GN111 and ISOBE5600t The battery is compliant with CE / UL 2054 / UL1642 / FCC / IEC 62133 / EN 60950 / RoHS / UN 38.3 / PSE / RCM / CQC / BIS IS 160346 **Note** *Check the import restrictions before ordering batteries from HBM.*	1-G034
Battery carrier		Li-ion battery carrier for GN110/GN111 and ISOBE5600t. Battery (1-G034) not included.	1-G301
2 bay Li-ion battery charger		Li-ion two bay battery charger for GN110/GN111 and ISOBE5600t batteries. Accepts two batteries without removing the carrier.	1-G109
Fiber cable MM LC-LC		GEN DAQ standard zipcord fiber optic duplex Multi Mode 50/125 µm cable, 3.0 dB/km loss, LC-LC connectors, aqua, ISO/IEC 11801 type OM3. Typically used for fixed cable routing or LAB environments. Lengths: 3, 10, 20 and 50 meters (10, 33, 66 and 164 ft)	1-KAB280-3 1-KAB280-10 1-KAB280-20 1-KAB280-50

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