

ES650

Thermo and A/D Module of the Compact Device Family



The ES650 represents a combination of the ES620 Thermo Module and the ES610 A/D Module of the new compact device family from ETAS. All modules of this new generation provide rapid and easy connectivity, thereby greatly facilitating the handling of several devices. A well thought-out cable concept ensures that the modules are connected with ease, reverse-voltage protection and clarity.

Modern and Proven Transmission Protocol

A proven and powerful Ethernet with TCP/IP protocol is used to transfer data between the modules and to the PC. In contrast to CAN and SMB there are no bandwidth limitations. Easy module handling with automatic assignment of IP addresses, future integration into the in-house network, and diagnosis and remote maintenance of the modules via the Internet are just a few of the benefits of this technology. If several measurement modules are used in a network, the ES600 system module synchronizes the connected modules and thus ensures a time stability in the range of milliseconds.

Automotive Measurement Recording

The ES650 has eight thermo inputs and eight A/D inputs. All 16 channels are electrically isolated from each other and from the supply voltage to achieve a consistently high common-mode rejection, thus ensuring maximum measurement accuracy even at extremely low voltages and non-potential-free thermocouples. A separate cold-junction

compensation at each input connector significantly minimizes the measurement error, even when ambient temperatures are fluctuating.

The ES650 supports type J, K and N thermocouples covering a measuring range of $-210\text{ }^{\circ}\text{C}$ to $+1372\text{ }^{\circ}\text{C}$ ($-346\text{ }^{\circ}\text{F}$ to $2502\text{ }^{\circ}\text{F}$). The module operates at a resolution of 21 Bit over the entire range, which allows a minimum measurement unit of $0.01\text{ }^{\circ}\text{C}$ with a basic accuracy of $\pm 0.25\text{ }^{\circ}\text{C}$ (K type). At a resolution of 16 Bit, two selectable measuring ranges are available for high precision voltage measurements. The ES650 reaches a basic voltage measurement accuracy of up to 2 mV. To maintain the high precision even at large fluctuations of the ambient temperature, the measuring module has an ultra-low temperature coefficient of only $10\text{ ppm}/^{\circ}\text{C}$. To avoid capturing redundant data, the ES650 allows the software filter and sampling rate to be optimized individually for each module.

Tailored for the Automotive Industry

The captured data is transferred to the PC or ES600 via an Ethernet connection. The ES650 uses a power-saving transfer rate of 10 MBit/s to minimize the power consumption and heat-up of the device. In addition, the module detects when the connection to the PC is interrupted and automatically switches to stand-by mode. The ES650 can also be connected directly to the battery voltage supply for long periods.

At a Glance

16 electrically isolated measuring channels for analog voltages

Measuring channels electrically isolated from the supply voltage

Adjustable acquisition rate per channel

Parameterized software filter for signal smoothing

High measuring accuracy through 16 Bit (A/D) or 21 Bit (thermal) resolution

Two selectable measuring ranges of $\pm 10\text{ V}$ and $\pm 60\text{ V}$

Automotive measuring range of $-210\text{ }^{\circ}\text{C}$ to $1372\text{ }^{\circ}\text{C}$ ($-346\text{ }^{\circ}\text{F}$ to $2502\text{ }^{\circ}\text{F}$)

Data transfer to PC or ES600 via Ethernet

Rugged, functional metal housing

Member of the ETAS Tool Family – supported by INCA

Calibration service

Technical Data

Item	Characteristics		
General	Dimensions (H/ W/D)	72 x 125 x 160 mm / 2.8 x 4.9 x 6.3 in.	
	Weight	1085 g / 2.39 lbs	
	Temperature range	-40 to +70 °C / -40 to 158 °F (operation) -40 to +70 °C / -40 to 158 °F (operation)	
Power supply	Operating voltage (reverse voltage protection)	6 to 32 V DC, reverse-voltage protected up to 40 V, protected against load dump	
Current consumption	Continuous/Stand-by	270 mA (continuous); 5 mA (stand-by), each at 12 V	
PC interface	Connection	10 MBit/s Base-T Ethernet	
	Protocol	TCP/IP	
	IP address	dynamically via INCA	
Thermal inputs	Number of channels	8	
	Resolution	21 Bit, corresponding to 0.01 °C	
	Acquisition rate	0.1 samples/s to 10 samples/s, configurable per channel	
	Measuring range		-210 to +1200 °C / -346 to 2192 °F (J type)
			-200 to +1372 °C / -328 to 2502 °F (K type)
			-200 to +1300 °C / -328 to 2372 °F (N type)
	Limit frequency	10 Hz	
	Input impedance	> 10 MΩ 1 nF	
	Measuring error of thermocouple at 25 °C / 77 °F ambient temperature		0.2 °C + (T _{meas} * 0.03 %) for J type
			0.25 °C + (T _{meas} * 0.025 %) for K type
			0.38 °C + (T _{meas} * 0.035 %) for N type
	Temperature drift of thermocouple		±0.004 °C/°C for J type
			±0.005 °C/°C for K type ±0.008 °C/°C for N type
	Measuring error of CJC at 25 °C / 77 °F ambient temperature		± 1 °C
	Temperature drift of CJC		0.008 °C/°C
A/D inputs	Number of channels	8	
	Resolution	16 Bit, higher at slower sampling rates	
	Acquisition rate	0.5 samples/s to 2 ksamples/s, configurable per channel	
	Input voltage ranges	±10 V, ±60 V	
	Input filter	Low-pass of 4th order, limit frequency 1 kHz, max. overshooting 3 %	
	Input impedance	> 15 MΩ 1 nF (±10 V); 2 MΩ 1 nF (±60 V)	
	Measurement error		2 mV + (U _{in} * 0.05 %) in ±10 V measuring range
		12 mV + (U _{in} * 0.05 %) in ±60 V measuring range	
Temperature drift		10 ppm/°C, relative to input voltage	
Inputs general	Electrical insulation of inputs	±100 V channel to channel; ±100 V channel to supply voltage	

Orderinformation

Order Name	Short Name	Order Number
Scope of Delivery		
ES650, combined analog voltage and temperature measuring module, 8 channels each	ES650	F 00K 102 751
T-connector for ES600 housing	ES600_H_TB	F 00K 001 925
ES650 manual, German/English	ES650_UG_DE/_EN	F 00K 102 781/780
Ethernet and voltage Y-cable, 2 m / 6.5 ft	CBEP110-2	F 00K 102 585
Optional Accessories		
Analog input cable with banana connector (Banana-Lemo)	CBAV180-1m5	F 00K 102 660
Ethernet and power cable, 0.45 m / 1.5 ft (Lemo-Lemo)	CBE130-0m45	F 00K 102 748
Ethernet and power cable, 1 m / 3 m / 8 m (3.3 / 9.8 / 26.3 ft) (Lemo-Lemo)	CBE130-1/-3/-8	F 00K 102 588 /587/586
Set of 8/16 analog input cables (Banana-Lemo)	CBAV180-1m5_SET8/16	F 00K 103 107/106
Calibration service for ES650	K_ES650	F 00K 103 110

For complete ordering information and accessories for the ES650 module, please refer to www.etas.com/ES650.

For more information, please contact your local ETAS representative.

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