

The CANect[®] CL-T27 joins the award-winning product line-up from HED, built to power the future of IoT innovation. Delivering global LTE and Wi-Fi in a single module, on-device connection capabilities like ethernet and USB 2.0, and a robust Linux-based software configuration, the CL-T27 is built to support proprietary innovations in rugged environments.

CANect offers the best in telematics (M2M) and Internet of Things (IoT) capabilities. The CL-T27 combines Wi-Fi (2.4 & 5GHz) and global cellular connectivity options into a single module that also includes common software configurations and convenient on device connection capabilities such as Ethernet and USB 2.0 host/client. Similar to the CL-T16 and CL-T17, the CL-T27 uniquely provides 3rd party support of LTE SIM cards allowing you to choose your own carrier for connectivity needs. The all-in-one connected module is a capable product with telecaching and a variety of features that make telematics and M2M applications possible.

Functionality:

- **Interactive troubleshooting** with immediate feedback from controls
 - Turnkey Wi-Fi Hosted Webpage (CANect[®] View)
 - Remotely connected direct vehicle access (CANect[®] Reflector)
- **Remote Programming** - OTA programming via Cell/Wi-Fi Connectivity
- **Predictive Maintenance** - real-time & historical trend monitoring
- **Integrated Security** - Encrypted package updates & CANect[®] Portal Communications

Features:

- Global 4G LTE Cat M1/NB1 cellular connectivity
- 802.11 a/b/g/n/ac Wi-Fi (concurrent host/client)
- Data logging capability - 8GB memory standard
- External Wi-Fi, Cellular, and GPS antenna (not included)
- 2 CAN ports - J1939 and CANopen capable
- Real-time clock
- 3-axis accelerometer
- GNSS—GPS, Glonass, BeiDou, Galileo
- USB 2.0 Host/Client



Figure 1: CL-T27-018-10

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Processor	
Processor	i.MX 6ULL, speeds up to 792MHz
Architecture	Arm® Cortex®-A7 Microprocessor
Operating System	Linux
Memory Ram Flash	DDR3L SDRAM – 512MB eMMC Flash – 8GB

Environmental	
IP Rating	IP67
Temperature ¹	-40°C to 70°C -Operating -40°C to 85°C -Storage
Internal Battery Temperature ²	-20°C to +60°C - Discharging 0°C to +45°C - Charging
RoHS Compliant	Yes

¹ Temperature range subject to use case. HED assumes heat dissipation based on general market software and solution use cases.

² Charging/Discharging control logic based on temperature.

Electrical Characteristics	
Operating Voltage	9V - 36V
Max Amp. Draw	300mA at 12V
Average Draw	270mA at 12V
Power Off - LI-Polymer	1.5 mA
Internal Battery	Lithium-ion Polymer (LiPo) 1500mAh
Battery Certification	UN38.3 and IEC62133-2

GNSS Interface	
Receiver	Concurrent reception of up to 3 GNSS. 72 Channel; GPS/GLONASS/Galileo/Beidou/QZSS, LTE & GNSS concurrency
Horizontal Accuracy	<2.5m; autonomous, open sky
Time to Update Positioning	1s
Time-to-First-Fix	Cold: 11.57s Hot: 1.8s Aided: 3.4s
Receiver Sensitivity	Tracking & Nav: -157 dBm Cold: -146 dBm Hot: -157 dBm
Supported Signals	Speed Over Ground (SOG), Course Over Ground (COG), Latitude, Longitude, Altitude, UTC Time, and Number of Satellites
Antenna	External x1

Accelerometer / Inclinometer	
Function	3-Axis
Sensitivity Range	+2/+4/+8/+16G Full Scale
Angular rate zero-rate	±3°
Sensitivity Change vs. Temperature	-40° to +85° Linear: +0.01 %/°C Angular: +0.007 %/°C

Cellular Communication	
4G LTE	Global 4G LTE Cat-M1/NB1 FDD - B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B10/ B20/ B28 TDD - B39 (CAT-M1 only)
Data Speeds	Cat-M1 Max. 375 kbps (DL), Max. 375 kbps (UL); Cat-NB1: Max. 32 kbps (DL), Max. 70 kbps (UL); EDGE: Max. 296 kbps (DL), Max. 236.8 kbps (UL); GPRS: Max. 107 kbps (DL), Max. 85.6 kbps (UL)
SMS	MT/MO; Cell Broadcast; Text & PDU
Protocols	PPP/TCP/UDP/SSL/TLS/FTP(S)/HTTP(S)/NITZ/PING/MQTT
SIM Format	3FF Micro SIM

Wi-Fi Interface	
Standard	802.11 a/b/g/n/ac (2.4 & 5GHz)
Operational Modes	Hotspot/AP and Client (concurrency supported)
Data Transfer Rate	2.4GHz - b: 11, 5.5, 2, 1 Mbps g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps n: 65, 58.5, 52, 39, 26, 19.5, 13, 6.5 Mbps 5GHz - a: 54, 48, 36, 24, 18, 12, 9, 6 Mbps n: 135, 121.5, 108, 81, 54, 40.5, 27, 13.5 Mbps ac: 390, 351, 292.5, 263.3, 234, 175.5, 117, 87.8, 58.5, 29.3 Mbps
Security	WPA2

Interfaces & Peripherals	
Ethernet	10/100Mbps x1; (10Base-T/100Base-TX)
High-Speed CAN	x2 ports; Identifier Support: 11 and 29 bit. Data Length: 0 to 8 bytes. ISO 11898
Data Rate / CAN Bus	20K, 50K, 100K, 125K, 250K, 500K, 1M bits/sec
I/O*	x1 Keypress, STB; x1 Battery+, VTD; x1 Analog Input, VTD; x1 Sinking Output, Max. 300mA

* Additional I/O hardware only, software development required

Universal Serial Bus (USB) ¹	
Interface	5pin USB with OTG
USB Standard	2.0 with OTG support
Data Transfer Rate	480Mb/s
Operational Modes	Host ¹ , Client ²
Application	Module configuration & programming

¹ USB Host is software configurable to respond to the OTG pin being grounded. Application Note: USB Host can support flash drives, user inputs, and various other devices

² Application Note: USB Client is a common method to reprogram or serial terminal into the device.

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CL-T27 Module Pinout	
Main Connector - 776164-1	
Pin	
1	NC
2	Analog Input 1 VTD (12V/24 [0V-32V])
3	Digital Input 2 STB (12V/24 [0V-32V])*
4	High Speed CAN2 High
5	High Speed CAN2 Low
6	CAN FD High*
7	CAN FD Low*
8	Keyswitch Input
9	NC
10	NC
11	Ethernet RXP
12	Ethernet RXN
13	NC
14	USB OTG/ID
15	Sinking Output 2 (12V [0V-18V], 300mA)*
16	Sinking Output 1 (12V [0V-18V], 300mA)
17	High Speed CAN1 High
18	High Speed CAN1 Low
19	Analog Input 2 VTD (12V/24 [0V-32V])*
20	NC
21	NC
22	Ethernet TXP
23	Ethernet TXN
24	Unswitched Battery (+) Module
25	Battery (-) Module
26	Programming Mode Trigger**
27	NC
28	NC
29	NC
30	NC
31	NC
32	USB Power 5V**
33	USB D+
34	USB D-
35	USB Ground

* Hardware only, software development required. Testing not included.

** PINs require connection within harnessing. Pre-connected within CL-T27-W01 adaptor harness.

Supercedes	
CL-T05 Family	Wifi Only
CL-T06 Family	3G Cell only
CL-T07 Family	Combo 3G Cell & WiFi
CL-T16 Family	4G Cell only
CL-T17 Family	Combo 4G Cell & WiFi

Mechanical	
Dimensions (mm)	125 x 124 x 42.43
Material	Polycarbonate
Certification	Flammability rating, UL94-V0
Mounting Options	Panel mount / Cable Tie
Number of mounts	2x #10 type bolt
Mounting Hardware	30mm M4
Avg. Mount Torque	0.5 Nm

LED Indicators	
LED 1	Red: Modem Power On/Off
LED 2	Green: Status Indicator Solid: connected to Portal Heartbeat: operating, not connected to Portal Blinking -- update in progress Off -- HED application error

RF Connections	
GNSS	Bottom Right. SMA x1
Cellular	Top Right. SMA x1
WiFi	Top Left. RP-SMA x1

Accessories	
Adaptor Harness (CL-T27-W01)	18-Pin (CL-T05-T17) to 35-Pin (CL-T27)
Mounting Adaptor (CL-T27-550-KIT-01)	CL-T05-T17 to CL-T27 Placement

WARNING OTG Pin	
When using the OTG (On the Go) pin 14 you should always use the USB ground pin (pin 35). Never hook it up to the battery ground pin (pin 25) as this will damage the harness.	

Software Development
Developers can choose between the CANect Software Development Kit (SDK) or the CANect Composer® solution development utility. Each piece of software is free to customers and requires an NDA.

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ISO Standards/Certifications

All testing completed using the 18-pin to 35-pin adapter (CL-T27-W01). Pins not represented are not end-of-line validated or included in testing.

EMC	
Radiated Emissions	30-1000MHz, ISO 13766 Limits
Conducted Immunity	ISO 11452-4 (BCI), 20-200MHz at 100mA
Radiated immunity	ISO 11452-2 (ALSE), 400MHz to 1000MHz (1KHz 80% AM); 800MHz to 2000MHz (PM ton 577µs; period 4600µs)
ESD	ISO 10605-1 powered, ±8kV contact and ±15kV air discharge

Electrical	
Reverse Polarity	-32V
Jump Start / Over-Voltage	ISO 16750-2 24V for 12V systems 36V for 24V (or 12/24V) systems
Transient Immunity	ISO 7637-2, Pulse 1, 2a, 2b, 3a, 3b
Starting Profile	ISO 16750-2, Section 4.6.3
Load Dump	ISO 16750-2, Section 4.6.4, 40V clamped

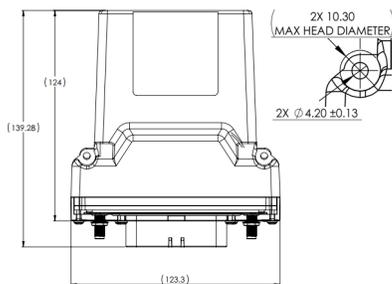
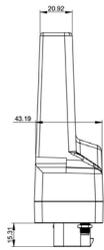
¹Temperature range subject to use case. Module throttling is expected during high-heat, high performance operation. HED assumes heat dissipation based on general market software and solution use cases.

Climate	
Storage Temperature ¹	-40C 4 hours; +85C 4 hours
Combined Environment ¹	-40C to +70C, 10 Days
Ingress Protection ¹	ISO 20653, IP6K7
Solar Radiation	IEC 60068-2-5 Edition 3.0
Salt Spray	ISO 16570-4 Sec 5.5.1
Chemical Resistance	Brake Fluid, Gasoline, Diesel Fuel, Isopropyl Alcohol, Denatured Alcohol, Paint Thinner, Mineral Spirits, Battery Acid, Engine Oil, Hydraulic Oil, Zip Strip, Bleach, Simple Green All-Purpose Cleaner, Ammonia

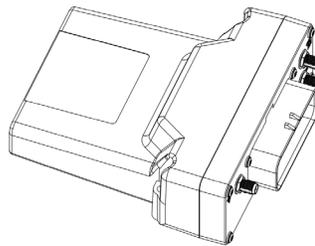
Mechanical	
Completed standalone (CL-T27) and with the mount adapter (CL-A27-550-KIT-01)	
Mechanical Shock	IEC 60068-2-27
Random Vibration	IEC 60068-2-64

Certifications	
Communications	FCC, ISED, CE, PTCRB, Aeris, AT&T, Verizon.
Environmental/Other	RoHS Compliant

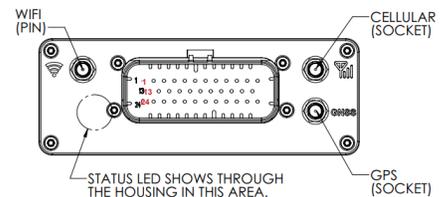
Mechanical Diagrams



Top View



Isometric View



Connector View

	i.MX6ULL	8GB eMMC	512MB RAM	CAN bus (es)	USB (Host/Client)	Wi-Fi (Host/Client)	LTE CATM1 (Global)	Carrier SIM	GPS	Antennas	Ethernet	Real Time Clock (RTC)	Accelerometer	Security IC	HED Branded	Customer Branded Opt.
CL-T27-018-10-9N	x	x	x	2	x	x	x	Aeris (N.A.)	x	Ext.	x	x	x	x		x
CL-T27-028-10-9N	x	x	x	2	x	x	x	Verizon (US)	x	Ext.	x	x	x	x		x
CL-T27-038-10-9N	x	x	x	2	x	x	x	Aeris (Inter.)	x	Ext.	x	x	x	x		x

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Accessories

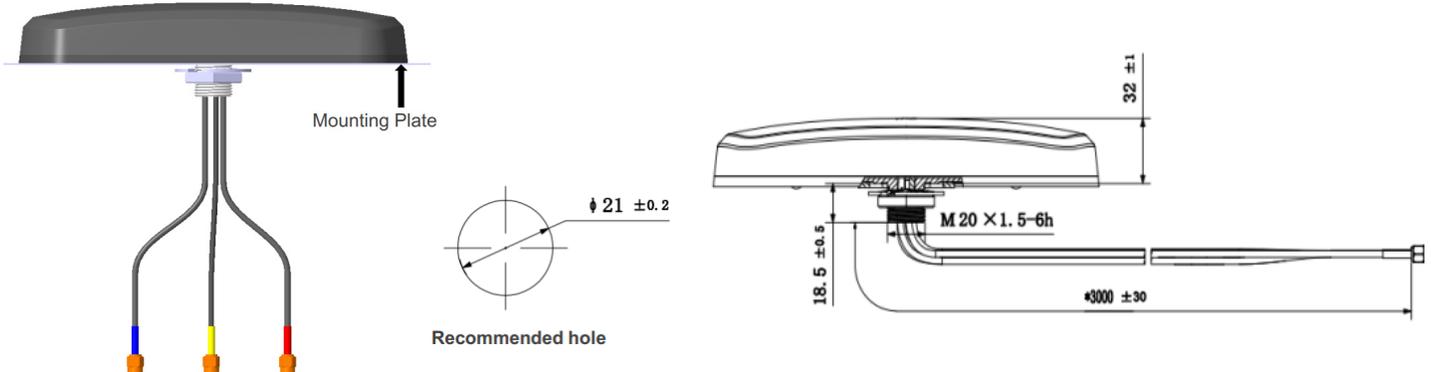
Recommended accessories for use with the CL-T27.

Antenna

Part Number: CL-A31-104-10

Mounting Instruction Screw (M20 Nut). Recommended installation nut torque: 3N.m~4N.m. Recommended mounting plate thickness: 1mm-4mm.

Cable Type & Length ALS302 Black & 3000 mm



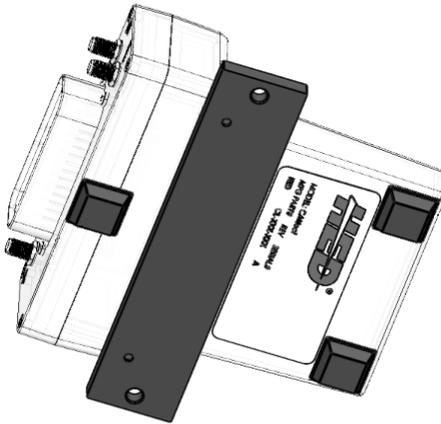
Migration Accessories

Recommended accessories for customers transitioning from CL-T05-T17 to CL-T27.

Mounting Adapter

Part Number: CL-A27-550-KIT-01

Components Adapter Plate (5.75" X 1.25" X 0.25") x1; Rubber Bumper (0.75X0.75X0.25 PSA)x3; Screw (M4x0.7MM X 25MM L) x2, Alcohol Pad x1



Adapter Harness

Part Number: CL-T27-W01

Harness Length 9 inches OR 228 mm.

Max. Bend Radius

Connector +3 inches or 76mm



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