Smart Color Touch MDT (50T0148-003) Manual

Version	Author	Approval date	Approved by	Change	DRN/DCN Number
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Contents

1 Overview

This document is to provide the specifications and recommendations for the interconnection of the Smart Color Touch MDT.

2 References

[1] SAE J1708 Serial Data Communication Between Microcomputer Systems in Heavy-Duty Vehicle Applications Aug 2004
[2] SAE 1939-11 Physical Layer, 250K bits/s, Twisted Shielded Pair Oct 1999
[3] Telit Jupiter JF2 Datasheet
[4] IEEE 802.3

3 Acronyms

Acronym	Meaning
DC	Direct Current
EMI	Electromagnetic Interference
FCC	Federal Communications Commission
GPS	Global Positioning System
IEEE	Institute of Electrical and Electronic Engineers, Inc.
LAN	Local Area Network
MTBF	Mean Time Before Failure
RMS	Root mean square
USB	Universal Serial Bus
Wi-Fi	Wireless network based on IEEE 802.11

4   Electromagnetic Specifications

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an output on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

5   Environmental

The Smart Color Touch MDT is designed and tested to meet the following SAE J1455 specifications.

5.1   Temperature

Operating: -20°C - + 60°C

Storage: -30°C - +75°C

5.2   Shock and Vibration

SAE J1455 Sec. 4.10.4.1 Swept Sine Wave Vibration:
Sweep 10 Hz to 2000 Hz, 2g's equivalent Sweep Rate of ½ Octave/min. for 3 hours/axis on 3 axis

SAE J1455 Sec. 4.11.3.4 Mechanical Operational Shock:
20g peak acceleration, 11 ms duration, ½ sine wave pulse shape 3 drops/axis on 3 axis

5.3   Electrostatic Discharge

5.3.1   SAE J1455 Sec. 4.13.2.2.3.1 SAE J1113/13:
Tested to +/- 4kV direct contact discharge.

5.3.2   SAE J1455 Sec. 4.13.2.2.3.2 SAE J1113/13 Operational (In-Vehicle) ESD:
Tested to +/- 8kV direct contact discharge.

5.4   MTBF

TBD hours MTBF minimum

5.5   Power Input

Operating voltage range: 8 – 36V DC

Current: Nominal value   1A @ 13.8V

Peak value 1.5 A @ 13.8V

Overvoltage (>36V) and reverse voltage protected.

5.6   Mechanical

Depth (w/o RAM ball mount): 63.5mm (2.5")
Depth (w/ RAM ball mount): 101.6mm (4.0")
Width: 254mm (10.0")
Length: 165.1 mm (6.5")

6 Connectors

6.1 Serial Communications

6.1.1 Connector

Connector: D-SUB 15 Female

Mating Connector: D-SUB 15 Male

6.1.2 Pinout

Pin #	Signal	Signal Type	Pin #	Signal	Signal Type
1	CAN1_H	CAN-High (Port 1)	9	GND	CAN-GND (Port 2)
2	CAN1_L	CAN-Low (Port 1)	10	CAN2_H	CAN-High (Port 2)
3	GND	CAN-GND (Port 1)	11	CAN2_L	CAN-Low (Port 2)
4	J1708_A	J1708-A	12	GND	J1708-GND
5	J1708_B	J1708-B	13	RS232_RX2	RS232 Receive Data (Port 1)
6	GND	RS232 GND (Port 2)	14	RS232_RX1	RS232 Receive Data (Port 2)
7	RS232_TX2	RS232 Transmit Data (Port 2)	15	GND	RS232 GND (Port 1)
8	RS232_TX1	RS232 Transmit Data (Port 1)			

6.2 Power

6.2.1 Connector

Connector: TE Connectivity 284516-3

Mating Connector: TE Connectivity 284510-3 or equivalent

6.2.2 Pinout (mating connector)

Pin Number	Signal	Signal Type
1	IGN_SENSE	Vehicle Ignition Sense
2	BATT-	Vehicle Battery 1
3	BATT+	Vehicle Battery +

6.3 I/O Connector

6.3.1 Connector
Connector: D-SUB 25 Female

Mating Connector: D-SUB 25 Male

6.3.2 Pinout

Pin #	Signal	Signal Type	Pin #	Signal	Signal Type
1	DISCRETE_IN1	Input 1	14	DISCRETE_IN2	Input 2
2	DISCRETE_IN3	Input 3	15	DISCRETE_IN4	Input 4
3	DISCRETE_IN5	Input 5	16	DISCRETE_IN6	Input 6
4	GND	Ground	17	HS_LINEIN_P	Handset Mic +
5	DISCRETE_OUT1	Output 1 (Open Drain)	18	HS_LINEIN_N	Handset Mic -
6	DISCRETE_OUT2	Output 2 (Open Drain)	19	GND	Handset Mic Shield
7	DISCRETE_OUT3	Output 3 (Open Drain)	20	HS_DIFF_LINEOUT1_P	Handset Spkr +
8	DISCRETE_OUT+5V	+5V Output	21	HS_DIFF_LINEOUT1_N	Handset Spkr -
9	GND	Ground	22	EXT_PA_LINEOUT2	PA Lineout
10	ODOM_SIGNAL_DIFF	Odometer Ground/ Differential -	23	GND	PA Lineout Return
11	ODOM_SIGNAL_IN	Odometer Signal/ Differential +	24	EXT_PA_OUT_P	PA Output +
12	GND	Ground	25	EXT_PA_OUT_N	PA Output 1
13	NC	Not Connected			

6.4 Ethernet

6.4.1 Connector

Connector: RJ45 Modular Connector Female

Mating Connector: RJ45 Modular Connector Male

6.4.1 Pinout

Use standard Cat5e or Cat6 Ethernet cable.

6.5 USB

Two USB 2.0 Type A female connectors.

- The USB +5V power is fused at 1A hold and 1.8A trip current on both connectors.

7 Card Interfaces

7.1 Micro-SD Card Slot

One MicroSD card slot for removable memory storage.

7.2 SIM Card Slot

One Mini-SIM (2FF) card slot.

8 Interface Specifications/Recommendations

8.1 J1708

See SAE J1708 Serial Data Communication Between Microcomputer Systems in Heavy-Duty Vehicle Applications Aug 2004 for best practices when connecting to a J1708 vehicle network.

8.2 J1939 (CAN Bus)

See SAE 1939-11 Physical Layer, 250K bits/s, Twisted Shielded Pair Oct 1999 for best practices when connecting to a J1939 vehicle network.

8.3 RS232

The minimum/maximum voltages on the bus are specified to be +/-15V. A '0' is +5 to +15V and a '1' is -5 to -15V. Voltages between -3V and +3V are undefined by the standard. The limiting factor for line length is the maximum allowable capacitance of 2500 pF. This limits the wire length to 15m (50ft).

8.3.1 12V Systems

Maximum voltages: -3 to +16V with the bus idle

8.3.2   24V Systems

Maximum voltages: -3 to +32V with the bus idle

8.4   Digital Inputs

$V_{IL} < 0.5V$ and V_{IH} 1.2V.

These inputs are protected with 47K of series resistance. Transients to 60V can be tolerated with circuit damage becoming more likely above 60V.

8.5   Digital Outputs

Three open drain outputs with a sink current fused at .5A hold current and 1A trip current.

One +5V output with a source current fuse at .5A hold current and 1A trip current.

8.6   Audio

The internal speaker is an 8 ohm speaker rated to 2W, 200 – 20,000 Hz.

The external speaker PA can drive a 4 or 8 ohm speaker up to 15W, 200 – 20,000 Hz.

Two microphones, one omnidirectional and one unidirectional (software selectable) with a sensitivity of -46 dB +/-3dB.

8.7   GPS

The Smart Color Touch MDT uses an active external GPS antenna. Specifications taken from Telit Jupiter JF2 Datasheet [3].

Channels	48
Sensitivity	To -163 dBm
Heading	0.01 deg
Velocity	0.01 m/s
Accuracy	2.5 m
Acquisition Rate	Cold start: 35s, average Hot start: 1s, average
Protocol	NMEA and OSP

8.8   Wi-Fi

The Smart Color Touch MDT uses an internal half-size mini PCIe Wi-Fi module with external antenna. This supports 802.11 b/g/n and WEP, WPA, and WPA2 encryption.

8.9 Ethernet

There is one 10/100/1000 BASET port. Full details of the physical layer are found at IEEE 802.3.

8.10 LTE/Cellular

The Smart Color Touch MDT uses an internal Mini PCIe (USB interface) LTE/Cellular modem with external diversity antenna. This supports diversity antenna configuration on LTE bands 4 (2100MHz) and 13 (700MHz) as well as the Cellular (800MHz) and PCS (1900MHz) CDMA bands.