

TECHNICAL DATA SHEET

SMART CUSTOMIZABLE DASHBOARD

MTA
Advanced Automotive Solutions



CONTENTS

2	Product version	12	Layout
3	General description	12	TFT
4	Block diagram	13	Dimensions and fixings
5	Specifications	14	Product qualification
8	Characteristics	14	Label details
10	Pinouts		

PRODUCT VERSION

This technical data sheet is related to following product versions:

PN#	Name	STANDARD CONTENTS						ADDITIONAL CONTENTS								CERTIFICATION
		10 LED telltales	4 analog inputs	7 digital inputs	1 CAN BUS	1 light sensor	1 frequential input	8 LED bar graph	Outputs: 1 LSD (2.5 A) + 1 LSD (0.5 A) + 4 HSD (10 W)	1 H-Bridge	RTC	1 Vss (Vref)	1 LIN	Output reverse battery protection	CAN BUS termination resistor	Type approval ECE ONU reg10-05 E3
6100318/3x	Smart Standard	X	X	X	X	X	X									X
6100352/0x	Smart OTS1	X	X	X	X	X	X	X	X	X	X	X	X	X		X
6100319/0x	Smart OTS1 CT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

GENERAL DESCRIPTION

SMART is a dashboard designed for motorbikes or similar vehicles with power supply at 12 Vdc.

Smart can be used as a dashboard with the following features:

- hour meter, odometer, gear, speed, engine RPM, trip data, etc.;
- digital signal interface and monitor;
- analog signals from external sensors.

Smart features:

- 1 color 4.3" TFT WQVGA;
- 10 telltales;
- 1 light sensor
- 7 digital inputs;
- 4 analog inputs;
- 1 frequency input;
- 1 CAN bus;
- 16 MB HyperFlash.

Available features only for OTS1:

- 8 LEDs for bar graph visualization;
- 2 low side drivers (1 channel 500 mA, 1 channel 2.5 A);
- 4 high side drivers (10 W load);
- 1 H-bridge (2 dedicated outputs, 10W motor);
- 1 Vss 5 V – 100 mA sensors supply;
- 1 LIN bus;
- RTC, without backup battery.

Available features only for OTS1 CT:

- CAN termination resistor.

Certification:

- type approval ECE ONU reg10-05 E3.

Smart is configurable with MTA Studio and MTA Gate.

MTASTUDIO

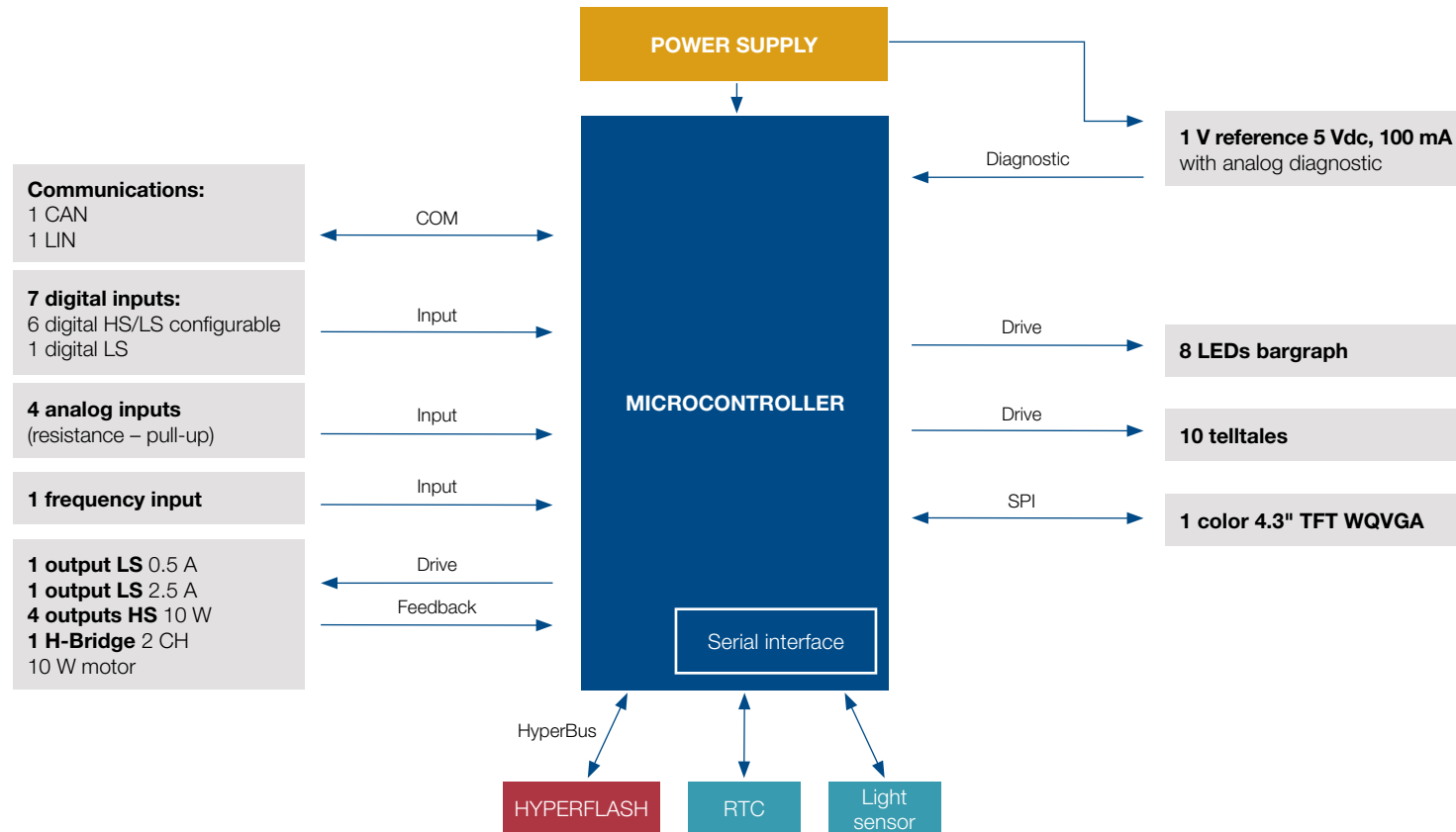
MTA Studio is a specific tool used to program dashboards, displays and electronic control units which have been developed with customizable functions allowing the customers to create "tailored" devices.

MTAGATE

MTA Gate is a specific tool designed for EOL department and/or for technical service points use.

Please contact MTA to verify which features can be programmed with MTA Studio and MTA Gate.

BLOCK DIAGRAM



SPECIFICATIONS

	Qty		Qty
Operating voltage		Microcontroller	
Nominal	12 Vdc	ARM Cortex R5F	Cypress Traveo S6J32XXX
Supply voltage, permissible range	9-16 Vdc	Operating temperature range	-40 to +105 °C
Operating temperature		Clock frequency	
External ambient temperature	-30 to +70 °C	MHz	240
Storage temperature		Internal memory capacity in microcontroller	
External ambient temperature	-40 to +85 °C	Flash	2112 KB
Protection rate		TCRAM	128 KB TCRAM + 128 KB SDRAM
IP66		Video RAM	2048 KB
Weight		GPU	
350 gr		2D Engine	Yes
Mounting location		3D Engine	No
Passenger compartment or mounting on the exterior frame		Memories	
Telltale		EEPROM	Internal on MCU (emulated on Flash block)
High efficiency LED	Light intensity driven by PWM	Hyperflash	16 MB (contact MTA to verify alternative options)
Digital indicators		Real time clock (optional)	
LED bar graph (optional)	8 high efficiency LEDs driven by PWM	Non battery powered	✓
Display		Clock time deviation: ±2.17 sec per day (temperature range: -40 to +85 °C)	
TFT 4.3" WQVGA display, form factor 16:9	Color, 480x272 pixels, 16.7 M colors		

	Qty
Ambient light sensor	
Ambient light sensor for manual night and day view managed	✓
PCB temperature sensor	
Internal	✓
Battery voltage measurement	
Internal	✓ Accuracy: ±5% of full scale value
Backlight	
LCD	White with dimming function
Interfaces	
CAN bus (up to 1 Mb/s) (CAN FD optional with dedicated software release)	ISO 11898 With wake-up function 1
LIN bus (optional with dedicated software release)	LIN 2.1, master 1
CAN bus termination resistor	
Termination resistor	Mounted on dedicated PN#, see "Product version" section
Current consumption	
At key-off	< 400 uA at 12 Vdc, 25 °C
Constant voltage source (Vref)	1
PMIC	5 Vdc / 3.3 Vdc / 1.2 Vdc

	Qty
External sensor supply	5 Vdc ± 2% (100 mA max)
Analog inputs (resistance mode)	4
N° 1 (0-5 Vdc-Vref) and N° 3 (0-16 Vdc), pull-up by hardware configuration	12 bit
Digital inputs	7
High side/low side with pull-up/pull-down, software configurable	Wetting current 2 mA 6
Digital low side with pull-up	Wetting current 2 mA 1
Frequency inputs	1
Multifunction inputs (see "Frequency input" paragraph)	Up to 5 kHz
Low side outputs	2
Not current controlled PWM (optional)	Max. 0.5 A 1
Not current controlled PWM (optional)	Max. 2.5 A 1
High side outputs	5
Current controlled PWM (optional)	10 W load (f_{PWM}) ¹ 4

1-2. Frequencies are fixed in MTA BSP software, default values used for qualification are: $f_{PWM} = 100$ Hz, $f_{H-BRIDGE} = 16$ KHz.

	Qty
Current controlled PWM 10 W full-bridge (optional)	10 W motor ($f_{H-BRIDGE}$) ² 1
Fault detection in the event of cable break and short circuit	
Inputs	✓
Outputs	✓ For PWM outputs only in ON state
Reverse polarity protection³	
Power supply	✓
Inputs	✓
Outputs (optional)	✓
Wake-up	

3. For the reverse polarity protection it's necessary to apply a MiniVal fuse with size not higher than 15 A on the battery power supply. With the nominal load connected, the low side outputs are activated without risk of damaging any part, since the current is limited by the load itself.

	Qty
From key, CAN line, all digital inputs	✓
Materials and other mechanical characteristics	
Front mask: plastic PC+ABS Black RAL 9005	
Back side: plastic PC+ABS Black RAL 9005	
Chassis Gore-Tex valve for environment air exchange	
Protective glass features	
Optically bonded	✓
Soda Lime cover glass chemically strengthened (6H)	✓

CHARACTERISTICS

COMMUNICATION INTERFACES

- CAN bus is according to protocol 11898-1 v2.0 part A, B. Data rate is up to 1 Mbps. Wake-up capability.
- LIN communication is compliant with LIN 2.1 master.

DIGITAL AND ANALOG INPUTS

Characteristics

- Digital high side/low side inputs software configurable (pins 12, 18, 19, 20, 21, 23):
Switch Detection Threshold $3.7 \text{ Vdc} < 4 \text{ Vdc} < 4.3 \text{ Vdc}$.
- Digital low side input (pin 22):
Switch Detection Threshold $3.7 \text{ Vdc} < 4 \text{ Vdc} < 4.3 \text{ Vdc}$.
- Analog input (pins 28, 29, 30, 31) with range:
 - pin 28: pull-up to key 587.5Ω ; accuracy: $\pm 10\%$ of the read value in the range 0.1-5 K Ω ;
 - pin 29: pull-up to sensor supply V_{ref} (5 Vdc) 33 k Ω ; accuracy: $\pm 25\%$ of the read value in the range 1-4 K Ω ; $\pm 20\%$ of the read value in the range 4 K-330 K Ω ;
 - pin 30, 31: Pull-up to key 900 Ω ; accuracy: $\pm 10\%$ in the range 0.1-1 K Ω ; $\pm 20\%$ of the read value in the range 1-10 K Ω .
 Pull-up to 5 Vdc/16 Vdc by hardware configuration, not software configurable.
- Switch contact resistance $\leq 10 \Omega$.

Wake-up functionality

All digital inputs can be programmed with wake-up capability, by configuring CAN message by MTA Studio.

Wetting current activation

All digital inputs provide cleaning contact function (wetting current), by configuring CAN message by MTA Studio (0-2 mA).

FREQUENCY INPUT (PIN 11)

Maximum frequency 5 kHz.

It can be used for:

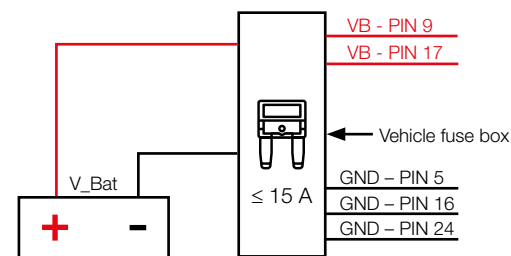
- frequency input alternator (W) square wave:
 - from 1 Hz to 5 kHz; duty cycle min 30%, max 70%, typical 50%;
 - V_{Lmax} : 1 Vdc, V_{Hmin} : 3 Vdc;
 - accuracy: $\pm 10\%$ of read value.

OUTPUTS

Protection

Driver protection in case of overload, short circuit and overvoltage.

For the short circuit protection it is necessary to apply a MiniVal fuse with size not higher than 15 A on the battery power supply.



Output high side 10 W load characteristics (pins 13, 4, 14, 5):

- minimum load resistance: min 9 Ω at 13.5 Vdc;
- power supply from battery input;
- current monitoring by analog current sense (accuracy: $\pm 10\%$ of read value in 0.7-1.1 A range);
- for inductive loads with characteristics out of these requirements a dedicated evaluation has to be done.

Output high side 10 W H-bridge characteristics (pins 1, 10):

- minimum load resistance with 50% PWM: min 9 Ω at 13.5 Vdc;
- power supply from battery;
- current monitoring by analog current sense (accuracy: $\pm 20\%$ of read value in 0.2-2.2 A range);
- for inductive loads with characteristics out of these requirements a dedicated evaluation has to be done.

Output low side 2.5 A characteristics (pins 6):

- minimum load resistance: min 5.1 Ω at 12 Vdc (6.8 Ω at 16 Vdc);
- recirculation diode connected to battery input;
- diagnosis by digital status;
- for inductive loads with characteristics out of these requirements a dedicated evaluation has to be done.

Output low side 0.5 A characteristics (pin 15):

- minimum load resistance: min 24 Ω at 12 Vdc (32 Ω at 16 Vdc);
- recirculation diode connected to battery input;
- output voltage monitoring by analog voltage sense 0-16 Vdc (accuracy: $\pm 5\%$ of full scale value);
- for inductive loads with characteristics out of these requirements a dedicated evaluation has to be done.

AUXILIARY SUPPLIES

One auxiliary supply for external sensors (V_{ref}) is provided at 5 Vdc (accuracy: $\pm 2\%$), with 100 mA current.

LOAD DUMP PROTECTION

It is provided without load dump protection for 12 Vdc systems:

- Load dump test for 12 Vdc system (with centralized suppression on vehicle):
 $U_s = 101 \text{ Vdc}$; $U_s^* = 35 \text{ Vdc}$; $R_i = 3 \Omega$ $T_d = 400 \text{ ms}$; $T_r = 10 \text{ ms}$.
Any other type of load dump protection, different from tests specified above, has to be evaluated by MTA.

TELLTALES

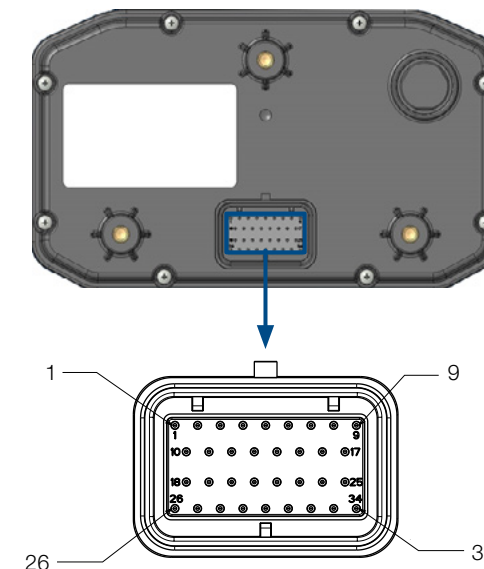
All 10 telltales are driven by the microprocessor.

Each telltale is made by high efficiency colored LED, PWM controlled to achieve light intensity compensation.

PWM is 100% at 9 Vdc; for $V_{bat} > 9 \text{ Vdc}$, PWM duty cycle is reduced to compensate the luminance.

MATING CONNECTOR

Mating connector used for wiring harness is a Tyco 34 pins, 3 keys, PN# 4-1437290-0.



PINOUTS

PIN	NAME	TYPE	MTA STUDIO NAME ⁴
1	OUT_0	H-Bridge *	OUT0
2	-reserved-	-reserved-	-reserved-
3	-reserved-	-reserved-	-reserved-
4	OUT_6	High side output *	OUT6
5	OUT_8	High side output *	OUT8
6	OUT_3	Low side output *	OUT3
7	LIN	LIN bus *	LIN
8	GND (Terminal 31)	Battery ground	GND
9	VB (Terminal 30)	Battery power supply	V+30
10	OUT_1	H-Bridge *	OUT1
11	IN_1	Frequency input	FI0
12	IN_2	Digital input	DI1
13	OUT_5	High side output *	OUT5
14	OUT_7	High side output *	OUT7
15	OUT_2	Low side output *	OUT2
16	GND (Terminal 31)	Battery ground	GND
17	VB (Terminal 30)	Battery power supply	V+30
18	IN_3	Digital input	DI2
19	IN_4	Digital input	DI3
20	IN_5	Digital input	DI4

4. The MTA Studio names here listed refer to the MTA Studio ID variants 0202 and 0502 for Smart, written on the product label (see "MTA Studio identification"). Please contact MTA for any info about it.

21	IN_6	Digital input	DI5
22	IN_7	Digital input	DI6
23	IN_8	Digital input	DI7
24	GND (Terminal 31)	Battery ground	GND
25	VCTRL (Terminal 15)	Ignition input	V+15
26	-reserved-	-reserved-	-reserved-
27	-reserved-	-reserved-	-reserved-
28	IN_11	Analog input (0-16 Vdc)	AI0
29	IN_12	Analog input (0-5 Vdc)	AI1
30	IN_13	Analog input (0-16 Vdc)	AI2
31	IN_14	Analog input (0-16 Vdc)	AI3
32	CAN0_L	CAN0 bus low	CAN0_L
33	CAN0_H	CAN0 bus high	CAN0_H
34	VSS	AUX power supply *	Vref

NOTE: pins assignment is shown in the OTS1 and OTS1 CT versions, pins marked with (*) are not available on the Standard version.

LAYOUT



NOTE: The dial plate here described is only for reference purpose and available for the PN#s referenced in this document. Please refer to customer drawings for PN#s derived by this one, in which a custom dial plate is included.

TFT

Features:

- size: 4.3" landscape;
- form factor: 16:9;
- active area: 95.04 (W) x 53.86 (H) mm;
- resolution: 480 x 272 pixel (WQVGA) x 16.7M colors;
- contrast ratio: typical 1000:1 at Ta = 25 °C (min. 800:1);
- normally black;
- brightness: min 800 cd/m²;
- viewing angles: 80/80/80/80;
- FFS technology, transmissive, amorphous silicon LCD module;
- anti-glare and anti-reflective treatment (optional).

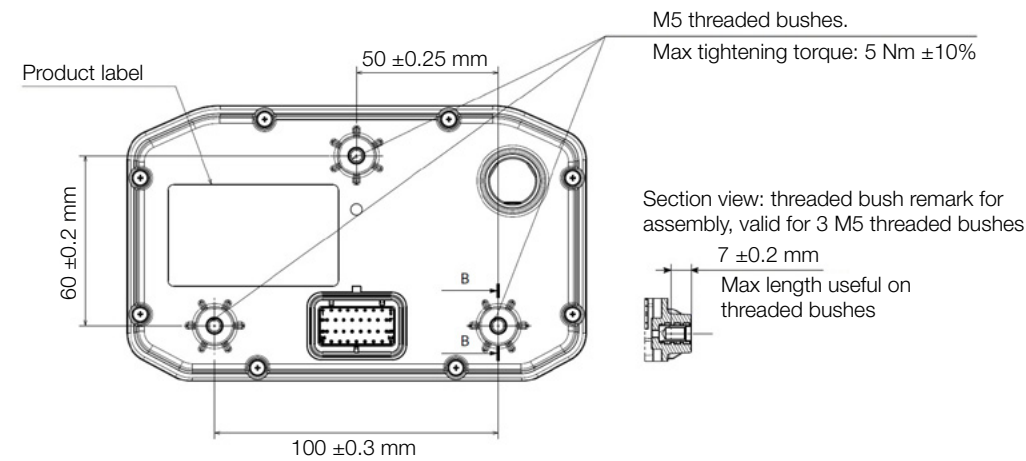
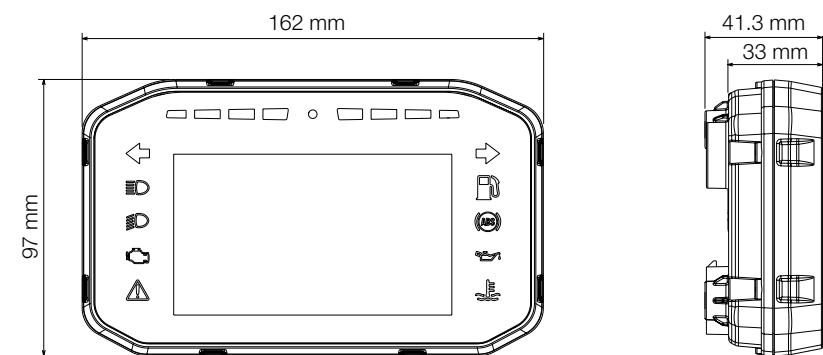
A software derating strategy has been implemented to preserve the display from overheating (contact MTA for details).



DIMENSIONS AND FIXINGS

Fixing is made by 3 screw fixing points.

WARNING: the vehicle producer has to verify if anti-vibrant mounts are needed to fix the Smart, depending on the installation conditions.



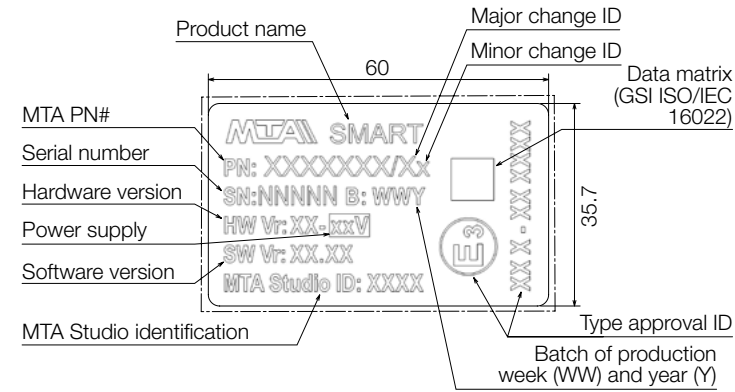
PRODUCT QUALIFICATION

Smart is qualified following the MTA Test Specification TS51_16 rev.1, which includes:

- environmental test;
- mechanical test;
- chemical test;
- electrical test;
- EMC test;
- CE type approval.

Please contact MTA for any additional detail.

LABEL DETAILS





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