

### Features

- Two identical interface channels for remote sensor units
  - Two connection modes: connection to OUTx and RETx or connection to OUTx and GND pin
  - 16 bit Standard SPI for control and diagnosis via a microcontroller
  - Supply voltage for each remote unit with a supply current up to 45mA
  - Current limitation with an analog feed back loop for each channel
  - Receive data from the remote unit by current modulation with a transmission rate of 10kHz
  - Transmission of data to the remote unit via PWM voltage pulses
  - Data input/output can be directly connected to a microcontroller input/output (CMOS)
  - Low current consumption
  - All pins to the external interface are short-circuit and high-voltage protected
  - High immunity against cross coupling between the two channels
  - The current modulation provides high noise immunity for data transfer
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### Applications

- This interface ASIC is designed for remote automotive sensors, especially between a main ECU and remote (sensor) units. It contains two identical interfaces and the main task of each interface is to supply one remote unit and to receive digital information from the same remote unit.
  - It is also possible to send data as PWM voltage pulses to the remote unit, for example to program the remote unit for its special application. This is done by one active wire: the interface supplies the external unit with a pre-regulated voltage, the external unit transmits the digital information back to the interface by current modulation.
  - A continuous diagnosis of the ASIC is running in background. The diagnosis results can be requested by a microcontroller using the SPI interface.
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### Ordering Code

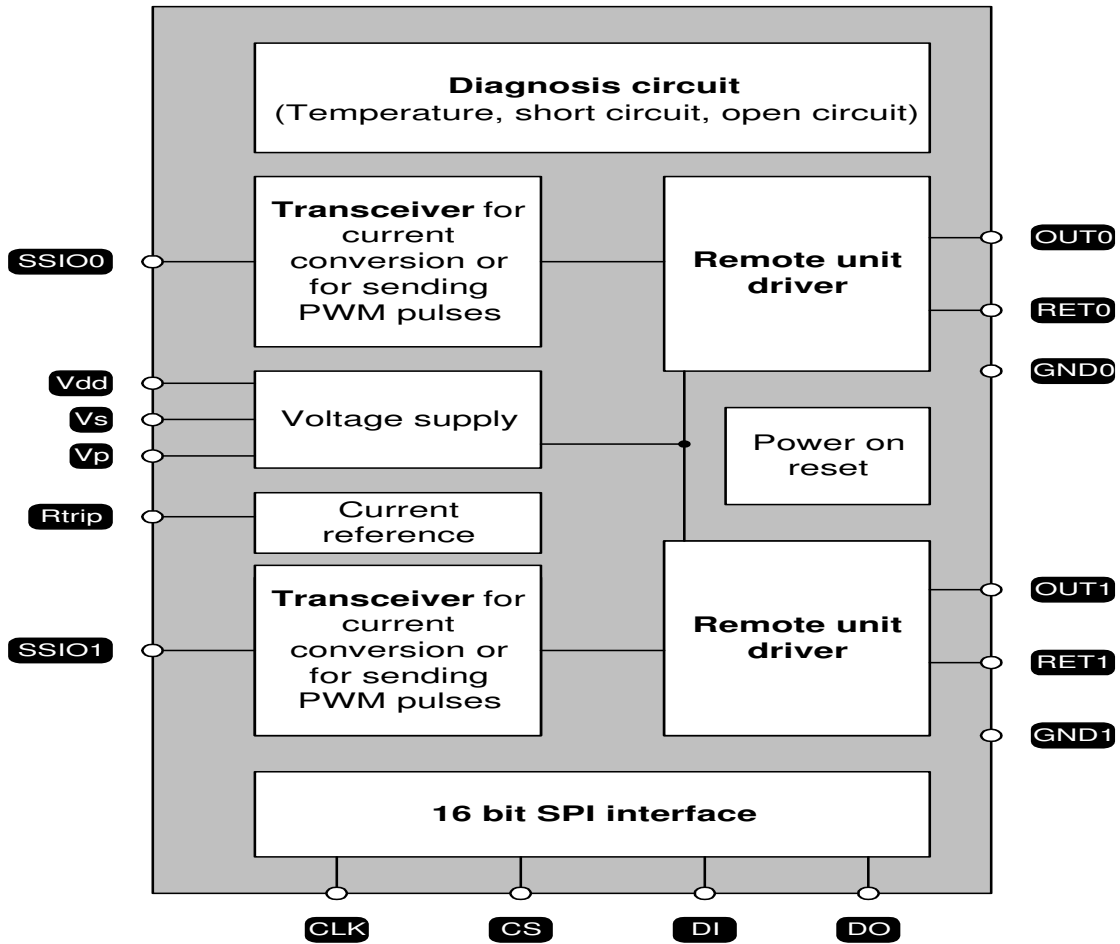
Product Code	Temperature Code	Package Code	Option Code	Packing Form Code
MLX16303	E	DC	GCA-000	RE

#### Legend:

Temperature Code: E for Temperature Range -40°C to 85°C  
Package Code: DC for SOIC150Mil  
Packing Form: RE for Reel

Ordering example: MLX16303EDC-GCA-000-RE

**Functional Diagram**



### MLX16303 electrical specifications

Tamb = -40 to 85 °C and Tj = -40 to 150 °C

VS operation supply voltage range 4.9V to 7.7 V (**Remote unit connection OUTx to RETx pin**) or

VS operation supply voltage range 6.0V to 7.7 V (**Remote unit connection OUTx to GND pin**)

VP programming voltage range 9.6V to 16.2V

All voltages referenced to the GND pins potential if no other voltage potential is mentioned

Parameter	Symbol	Conditions	Min	Max	Units
<b>VS (sidesat connection OUTx to RETx pin)</b>					
Supply Voltage Range	Vvs		4.9	7.7	V
Supply current OUT0 and OUT1 switched off	Ivsoff			6	mA
Supply current OUT0 and OUT1 switched on At 6.0V ≤ VS ≤ 7.7V, IOU0 = IOU1 = 45 mA	Ivson			100	mA
Supply current OUT0 and OUT1 switched on At 4.9V ≤ VS ≤ 6.0V, IOU0 = IOU1 = 35 mA	Ivson			80	mA
<b>VS (sidesat connection OUTx to GND pin)</b>					
Supply Voltage Range	Vvs		6.0	7.7	V
Supply current OUT0 and OUT1 switched off	Ivoff			6	mA
Supply current OUT0 and OUT1 switched on IOU0 = IOU1 = 45 mA	Ivson			100	mA
<b>VDD</b>					
VDD Voltage Range	Vvdd		4.9	5.1	V
VDD Supply current	Ivdd			1.5	mA
<b>VP threshold</b>					
Threshold Voltage for entering in Programming Mode (limits are relative to Vdd, rising edge)	Vvp	@25°C	9.4	9.6	V
Hysteresis of threshold Voltage for entering in Programming Mode (limits are relative to Vdd)		@25°C	0.05	0.15	V
<b>VP</b>					
Programming Voltage Range	Vvp		9.6	16.2	V

<b>Itrip: specified value is for Vdd=5V (threshold is relative to Vdd)</b>					
	Ithreshold	Rtrip=56 kOhms	Ithres- hold	Ithres- hold	mA
Current threshold for the rising edge (1)			14	24	
Hysteresis on current threshold			1	3.5	
<b>OUT0 and OUT1</b>					
Voltage drop between Vs and Out (Ioutx ≤ 45 mA for 6.0 V < VS < 7.7V, Ioutx ≤ 35 mA for 4.9 V < VS < 6.0 V)	Vout0_sat Vout1_sat			0.6	V
Switch on Time via SPI until 90% of Voutx is reached (with an output capacitance 120nF, Switch ON time start after the end of the SPI command)	tout0switchon, tout1switchon		3	30	μs
Switch off Time via SPI until 10% of Voutx is reached (with an output capacitance 120nF)	tout0switchoff, tout1switchoff		30	250	μs
<b>Short Circuit to GND</b> diagnosis threshold: Resistance from OUTx to GND	Rout0srtgnd, Rout1srtgnd		280	4.5K	Ω
Debounce time	tout0srtgndq, tout1srtgndq		500	2000	μs
Faults are latched. No debounce time for the release.	tout0srtgnddq, tout1srtgnddq		0	0	μs
<b>Short Circuit to battery</b> diagnosis threshold: Resistance from OUTx to battery	Rout0srthat, Rout1srthat		25	2.5K	Ω
OUTx: Voltage limit	Vout0>>, Vout1>>		Vs	Vs + 8%V	
Debounce time	tout0srthatq, tout1srthatq		500	2000	μs
<b>Short Circuit to according RETURNx</b> diagnosis threshold: Resistance from OUTx to according RETURNx	Rout0srtret0, Rout1srtret1		280	4.5K	Ω
Debounce time	tout0srtret0q, tout1srtret1q		500	2000	μs
Open loop ( IOUTx ) low current limit ( with Rtrip = 56K) ( remark: nominally equal to Ithreshold/10)	Iout0<<, Iout1<<		0.5	4.0	mA
Debounce time	tout0openret0q, tout1openret1q		500	2000	μs

(1) Definition of theoretical equation of Ithreshold:  $I_{\text{threshold}} \text{ (mA)} = 960/R_{\text{trip}} \text{ (kOhms)}$

<b>Non Programming Mode: connection OUTx to RETx</b>						
Voltage Range (voltage between Out and Return line !) Ioutx = 0mA ... 35mA	4.9 ≤ VS ≤ 6.0V	Vout0, Vout1		4.15	5.5	V
Voltage Range (voltage between Out and Return line !) Ioutx = 0mA ... 45mA	6.0 ≤ VS ≤ 7.7V	Vout0, Vout1		5.25	7.2	V
<b>Programming Mode: connection OUTx to RETx</b>						
Low Level Voltage Range 9.6V ≤ VP ≤ 16.2V 4.9V ≤ VS ≤ 7.7V (voltage Voutx between Out and Return line !) Ioutx = 0mA ... 20mA		Vout0, Vout1		4.15	7.2	V
High Level Voltage Range 9.6V ≤ VP ≤ 16.2V 4.9V ≤ VS ≤ 7.7V (voltage Voutx between Out and Return line !) Ioutx = 0mA ... 20mA		Vout0, Vout1		8.9	15.9	V
<b>Non Programming Mode: connection OUTx to GND</b>						
Voltage Range (voltage between Out and GND !) Ioutx = 0mA ... 45mA	6.0V ≤ VS ≤ 7.7V	Vout0, Vout1		5.4	7.2	V
<b>Programming Mode: connection OUTx to GND</b>						
Low Level Voltage Range 9.6V ≤ VP ≤ 16.2V 6.0V ≤ VS ≤ 7.7V (voltage Voutx between Out and GND !) Ioutx = 0mA ... 20mA		Vout0, Vout1		5.4	7.2	V
High Level Voltage Range 9.6V ≤ VP ≤ 16.2V 6.0V ≤ VS ≤ 7.7V (voltage Voutx between Out and GND !) Ioutx = 0mA ... 20mA		Vout0, Vout1		9.0	16.0	V

<b>Edges during voltage PWM ( programming mode)</b>					
Change from Voutx = low level to Voutx = high level ( with C=120nF & load consuming >= 5mA! - connected)	tssio0vlh, tssio1vlh			10	µs
Change from Voutx = high level to Voutx = low level ( with C=120nF & load –consuming >= 5mA! - connected)	tssio0vlh, tssio1vlh			50	µs
Capacity belonging to transmission				120	nF
Current pulse transmission rate			10		kHz
<b>RETURN0, RETURN1</b>					
Voltage drop. (Ioutx ≤ 45mA for 6.0V<VS<7.7V, Ioutx ≤ 35 mA for 4.9V < VS < 6.0V)	Vreturn0_sat Vreturn1_sat		0	0.15	V
Short Circuit to GND diagnosis threshold: Resistance from RETURNx to GND only when required by user with channel off	Rreturn0srtgnd, Rreturn1srtgnd		280	4.5K	Ω
Qualification time	treturn0srtgndq, treturn1srtgndq		500	2000	µs
Short Circuit to battery diagnosis threshold: Resistance from RETURNx to battery	Rreturn0srtbat, Rreturn1srtbat		25	2.5K	Ω
RETx: Voltage limit	Vret0>>, Vret1>>		0.2	0.4	V
Qualification time	treturn0srtbatq, treturn1srtbatq		500	2000	µs
RETURNx overtemperature protection: Switch off Temperature of driver junction	treturn0tempoff, treturn1tempoff		140	160	°C
Switch on Temperature of driver junction	treturn0tempon, treturn1tempon		130	150	°C
<b>SSIO0, SSIO1 (bidirectional CMOS)</b>					
Input low level voltage SSIO0, SSIO1	VIL		-0.5	2.0	V
Input high level voltage SSIO0, SSIO1	VIH		3.8	5.5	V
Input leakage current SSIO0, SSIO1	IPL			+/- 0.5	µA
Input Hysteresis SSIO0, SSIO1	IPH		0.4		V
Output low voltage SSIO0, SSIO1 Ido = 1mA	VOL			0.45	V
Output high voltage SSIO0,SSIO1Ido = -1mA	VOH		4		V
Ioutx range to get according SSIOx low level Rtrip = 56k	ISSIO0high, ISSIO1high		18	45	mA
Ioutx range to get according SSIOx high level Rtrip = 56k	ISSIO0low, ISSIO1low		5	16	mA

<b>Response time at SSIOx to current change</b>					
Change from loutx = low level to loutx = high level	tSSIO0ilh, tSSIO1ilh			20	μs
Change from loutx = high level to loutx = low level	tSSIO0ihl, tSSIO1ihl			20	μs
Current pulse transmission rate			10		kHz
<b>SPI signals (CMOS)</b>					
Input low level voltage DI, CS, CLK	VIL		-0.5	2.0	V
Input high level voltage DI, CS, CLK	VIH		3.8	5.5	V
Input leakage current DI, CS, CLK	IPL			±0.5	μA
Input Hysteresis DI, CS, CLK	IPH		0.4		V
Output low voltage DO      Ido = 1mA	VOL			0.45	V
Clock frequency	fcl			4	MHz
Time between two following commands	TCMD			1	ms
<b>Power dissipation</b>					
				1	W

## Functional Description

### VS (supply Voltage VDD2)

The ASIC and the external units are powered via the VS pin .VS is connected to a power unit ASIC output voltage.

### VP (programming Voltage VDD1)

For the programming of the remote sensor the MLX16303 needs a higher voltage than VS. This voltage is named VP.

VP is connected to the battery via a reverse battery protection diode (KL15). The VP pin may not source current under all conditions, especially after battery cut off.

### VDD (5V Voltage)

Additional to the VS and VP MLX16303 needs a low current 5V voltage for the digital part and reference use.

This voltage is named VDD.

### GND

The design has two GND pins.

### RTRIP (External Current Reference Resistor)

The trip point is established by setting a reference current via an external reference resistor connected to ground. This reference current is needed for the current threshold of the currentlevel-comparators. The current threshold can change with different resistors. This trip point is common for both channels.

### **OUT0, OUT1**

OUTx makes a smoothed, very slow changing supply voltage for the external remote units according to the given electrical characteristic and monitors the output current. Each OUTx stage has a short circuit, overvoltage and overtemperature protection. The OUTx voltage can be switched on and off via SPI.

There are two modes possible:

Programming mode:

The OUTx voltage can be modulated by the bi-directional remote unit interface ASIC between two defined voltage ranges.

Non Programming mode:

No communication to the remote unit is possible.

The data transmission from the bi-directional remote unit interface ASIC to the external remote unit is only enabled during the programming mode. The programming mode is enabled and disabled by a SPI command.

### **RETURN0, RETURN1**

The RETURNx pins make a low resistive connection to GND via a switched open collector transistor. RETURNx will switch on if OUTx is switched on via SPI and vice versa.

### **SSIO0, SSIO1 (SideSatelliteInOut)**

The SSIOx pins are bidirectional and have so multiple functions.

In the non-programming mode (normal operation) the current at the pin OUTx is sensed and logical evaluated as high or low current level. In this operation the pin is used as an output pin. At high current at OUTx, SSIOx switches to low level (CMOS-compatible) and vice versa.

In the programming mode the SSIOx pins are used as input pins. Logical (CMOS-compatible) PWM pulses from a microcontroller modulate the OUTx between two defined voltage ranges (high and low). At logical high at SSIOx, OUTx switches to high voltage level and vice versa. The SSIOx pins must have internal pulldown 50kOhm (tolerance +/- 20%) resistors

### ***Data transmission to the remote unit***

It is possible to send data to the remote units. For this the OUTx voltage can be modulated by the bi-directional remote unit interface ASIC between two defined voltage ranges (high and low) using the pins SSIOx. The low level is the default level. This programming mode is enabled and disabled with an SPI command. The data transfer to the satellite is only possible in a limited battery range, otherwise a failure flag via SPI will be sent to microcontroller.

### ***Data transmission from the remote unit***

The data transmission from the external remote units to the bi-directional remote unit interface ASIC is done by varying the current level.

The quiescent current consumption of the external remote units is interpreted as logic high level at SSIOx pin. This means the SSIOx output drives the high level if the quiescent current consumption is sensed at the according OUTx pin. The remote units can switch on an additional fixed current, interpreted by the interface as logic low level at SSIOx. The SSIOx pins are CMOS-compatible and can be connected directly to a microcontroller.

### **SPI (Serial Parallel Interface)**

The bi-directional remote unit ASIC is always the slave and the microcontroller the master of the 16bit serial parallel interface (SPI).

### Data transfer timing

The standard SPI needs four CMOS-compatible pins. The data input DI, the data output DO, the clock CLK and the chip select CS. The communication starts after the H-L edge of the CS signal (lowactive). The DI and DO signals are synchronized with CLK (CLK idle is low). The DI signal is latched from the databus to an internal shift register with the falling edge of the CLK signal. The DO signal is shifted from an internal shift register to the databus with the rising edge. The data output DO is in tristate mode when the CS signal is high. The CS will be deactivated after each command. CLK is only active during CS is set to low level. MLX16303 has to monitor the exact number of CLK-pulses by counting them. The answer after the first command must be the answer of the NOP-command.

### Communication protocol

The ASIC gets 16 bit data from the microcontroller via SPI. The bit 0 - 2 will be interpreted as a command. The other bits are data. When a command word is sent to the MLX16303 the first bit on the databus must be bit0 (LSB) followed by the bits 1-15. The first bit of the answer word from MLX16303 must be bit 0 followed by the bits 1-15. After transmission of a command with one command delay an 'answer word' is sent by MLX16303. If a command word matches completely with the known possible commands the respective action has to be done. The command word is fully reflected except for the bits that contain useful information in the command word. If a sent SPI command is not a defined one all bits in the regarding answer word must be set to '1'.

### SPI commands

Table of SPI commands

Command	Binary Code	Function
CMD_ONOFF	100b	Switch the remote units on/off (voltage OUTx)
CMD_DIAG1	010b	self diagnosis request when channel is ON
CMD_DIAG2	110b	self diagnosis request when channel is OFF
CMD_PROG	101b	Enable programming mode
CMD_NOP	001b	No Operation allows ECU to poll the answer of a previous command

#### CMD\_ONOFF

Switches the OUTx voltage for the selected channel (remote unit) on or off. CO0/1 will only be considered if CS0/CS1 is set.

Command

														MSB	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0	0	CO1	CS1	CO0	CS0	CMD_ON_OFF	
														LSB	

Bit	Function
CMD_ON_OFF	100 binary
CS0	Selection of channel 0 0: channel 0 not selected 1: channel 0 selected
CO0	Channel 0 activate/deactivate 0: channel 0 deactivated 1: channel 0 activated
CS1	Selection of channel 1 0: channel 1 not selected 1: channel 1 selected
CO1	Channel 0 activate/deactivate 0: channel 0 deactivated 1: channel 1 activated

Answer

														MSB															LSB
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0														
0	0	0	0	0	0	SC1	SC0	CMD_BYTE																					

Bit	Function
CMD_BYTE	Reflected lower byte of the command
SC0	Status of channel 0 0: channel 0 deactivated 1: channel 0 activated
SC1	Status of channel 1 0: channel 1 deactivated 1: channel 1 activated

### CMD PROG

Enables the communication to send data to the remote units (programming mode). All other commands are not influenced by the status of the PM bit.

Command

														MSB															LSB
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0														
0	0	0	1	1	0	0	0	0	1	0	0	PM	CMD_PROG																

Bit	Function
CMD_PROG	101 binary

PM	0: programming mode OFF 1: programming mode ON
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Answer

MSB														LSB				
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
0	0	0	1	1	0	0	PM	CMD_BYTE										

Bit	Function
CMD_BYTE	Reflected lower byte of the command
PM	Status about the actual programming mode status

The sent back bit PM can be set to '1' only if the supply for the programming mode (VP) is higher than Vvp (9.2 Volts).

### CMD\_DIAG1

Request of the actual diagnosis result of the bi-directional remote unit interface ASIC. This means a copy of the actual status after an error, generated by the continuous diagnosis in the bi-directional remote unit interface ASIC, is answered back to the microcontroller. If an error is detected, the diagnosis affected bit is memorized until the connected microcontroller has sent a CMD\_ONOFF with the channel selected and activated.

If the CMD is sent during the programming mode, the answer will be the same as for a wrong command (all the bits are set to '1'). The CMD\_DIAG1 is only possible in normal mode.

If the CMD\_DIAG1 is sent when the channel is off, the last status of the channel when it was on is replied. The diagnosis bits cannot change in off state even if an error appears (except for the bit DB4, over temperature bit, which represents the temperature status).

Command

MSB														LSB			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	CS	CMD_DIAG			

Bit	Function		
CMD_DIAG	Bit2	Bit1	Bit0
	0	1	0
CS	Select the channel 0: Channel 0 selected 1: Channel 1 selected		

Answer

MSB														LSB			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	CMD_BYTE									

Bit	Function
CMD_BYTE	Reflected lower byte
DB0	0: IOUTx OK 1: IOUTx to high
DB1	0: IOUTx OK 1: IOUTx to low
DB2	0: VOUTx OK 1: VOUTx to high
DB3	0: VRETx OK 1: VRETx to high
DB4	0: no fault 1: fault Overtemperature (both channels are turned off)
DB5	0: Channel is on 1: Channel switched off
DB6	0
DB7	0

### CMD\_DIAG2

Request of the actual diagnosis result of the bi-directional remote unit interface ASIC after an error has occurred, the channel was switched off and the exact error type (checked with CMD\_DIAG1) is still unclear. If the CMD is sent during the programming mode, the answer will be the same as for a wrong command (all the bits will be set to '1'). The CMD\_DIAG2 is only possible in normal mode.

If the CMD\_DIAG2 is sent when the channel is on, it is not a wrong command but the bit DB2 (CMD\_DIAG2 valid or not) is set to '1' and all the diagnosis bits are set to '0' (except for the bit DB4, overtemperature bit, which represents the temperature status).

Command

														MSB			LSB	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	CS	CMD_DIAG				

Bit	Function		
CMD_DIAG	Bit2	Bit1	Bit0
	1	1	0
CS	Select the channel 0: Channel 0 selected 1: Channel 1 selected		

Answer

	MSB	LSB
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15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	CMD_BYTE							

Bit	Function
CMD_BYTE	Reflected lower byte
DB0	0: VOUTx OK 1: VOUTx < VOFFFLOW
DB1	0: VOUTx OK 1: VOUTx > VOFFHIGH
DB2	0: DIAGNOSIS 2 valid (channel OFF) 1: DIAGNOSIS 2 invalid (channel ON)
DB3	0
DB4	0: no fault 1: fault Overtemperature (both channels are turned off)
DB5	0
DB6	0
DB7	0

### CMD\_NOP

No Operation allows ECU to poll the answer of a previous command.

Command

MSB														LSB	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	0	0	1	0	0	0	1	0	0	0	0	0	0	CMD_NOP	

Bit	Function
CMD_NOP	001 binary

Answer

Both bytes are reflected.

MSB														LSB	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	0	0	1	0	0	0	1	0	0	0	0	0	0	CMD_NOP	

### Unique Features

The MLX16303 provides a voltage/current communication interface for remote units. The required diagnostics (short circuit, open circuit, temperature) are implemented on-chip, which drastically reduces the need for applying external, discrete components for obtaining this functionality.

### Error detection and handling

The MLX16303 has a full set of problem detection:

- Short circuit between OUT and GND
- Short circuit between OUT and BAT
- Short circuit between RET and GND
- Short circuit between RET and BAT
- Short circuit between OUT and RET
- Open circuit between OUT and RET
- Overtemperature

If an error is detected the relevant channel will be switched off. After an error occurred it will be latched. The latched errors can only be reset by sending a CMD\_ONOFF to the MLX16303. The ECU can read out the detected errors using the SPI interface. The error detection in MLX16303 reacts before any damaging or unreliable operation can occur.

#### Handling of an invalid SPI command

In the corresponding answer word all bits will be set to '1'.

Answer to an invalid SPI command:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

### Absolute Maximum Ratings

All voltages referenced to the GND pins potential if no other voltage potential is mentioned.

Parameter	Symbol	min.	max.	Unit
Supply Voltage at VS	Vvs	-0.6	8	V
Supply Voltage at VDD	Vvdd	-0.6	5.1	V
Programming Voltage at VP ( the 40V can only be present during load dump (< =400 ms) otherwise the max voltage will be 24V for 2 minutes )	Vvp	-0.6	40	V
Voltage at OUT0, OUT1 ( the 40V can only be present during load dump (< =400 ms) otherwise the max voltage will be 24V for 2 minutes )	VOUT0, VOUT1	-0.6	40	V
Voltage at RETURN0, RETURN1	VRETURN0, VRETURN1	-0.6	40	V
Supply Current at VS (worst case) ( I vs max = [ Isrc OUT0 max = Isrc OUT1 max] *1.1, the factor 1.1 includes the internal current consumption)	lvs		220	mA
Supply Current at VS ( under condition that it is guaranteed by SW that never both channels with short circuit condition are switched on at the same time) ( lvs max = [ 100mA + 45mA] *1.1,	lvs		160	mA

Parameter	Symbol	min.	max.	Unit
the factor 1.1 includes the internal current consumption)				
Supply Current at VDD	Ivdd		1	mA
Source Current at OUT0, OUT1	IsrcOUT0, IsrcOUT1		100	mA
Source Current limitation at OUT0, OUT1		3 x Ithreshold	6 x Ithreshold	mA
Sink Current at OUT0, OUT1 (if output is switched off)	IsinkOUT0, IsinkOUT1	-0.5	0.2	mA
DC Input Voltage at: SSIO0, SSIO1, CLK, CS, DI	VSSIO0, VSSIO1 Vclk, Vcs, Vdi	-0.5	5.5	V
DC Output Voltage at: SSIO0, SSIO1, DO	VSSIO0, VSSIO1 Vdo	-0.5	5.5	V
DC Input current per pin at: SSIO0, SSIO1, CLK, CS, DI	ISSIO0, ISSIO1 Iclk, Ics, Idi		1	mA
DC Output current per pin at: SSIO0, SSIO1, DO	ISSIO0 ISSIO1 Ido		1	mA
Resistor to GND at RTRIP	Rrtrip	35k	75k	$\Omega$
Temperatures: operating ambient temperature range operating junction temperature range storage temperature range	Tamb Tj Tsto	-40 -40 -65	90 150 125	$^{\circ}\text{C}$ $^{\circ}\text{C}$ $^{\circ}\text{C}$
Thermal resistance: Thermal resistance junction to pin	Rthjc		30	k/W

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