

Dual CAN Flexible Data-Rate Transceiver

Features

- Supports both “classic” CAN 2.0 and CAN FD physical layer requirements
- Optimized for CAN FD (Flexible Data-Rate) at 2, 5 and 8 Mbps Operation:
 - Maximum Propagation Delay: 120 ns
 - Loop Delay Symmetry: -10%/+10% (2 Mbps)
- Implements ISO-11898-2 and ISO-11898-5 Standard Physical Layer Requirements
- Very Low Standby Current (5 μ A per transceiver, typical)
- Two Fully Independent V_{DDX} and V_{SSX} Pins per CAN FD Transceiver for Added Flexibility and Reliability:
 - Optimal for redundant CAN networks
- Compatible to 5V MCUs
- Functional Behavior Predictable Under All Supply Conditions:
 - Device is in Unpowered mode if V_{DDX} drops below undervoltage level
 - An unpowered node or brown-out event will not load the CAN bus
- Detection of Ground Fault:
 - Permanent dominant detection on T_{XDX}
 - Permanent dominant detection on bus
- Power-on Reset and Undervoltage Lock-out on V_{DDX} Pin
- Protection against Damage due to Short-Circuit Conditions (positive or negative battery voltage)
- Protection against High-Voltage Transients in Automotive Environments
- Automatic Thermal Shutdown Protection
- Suitable for 12V and 24V Systems
- Meets or exceeds Stringent Automotive Design Requirements, including “*Hardware Requirements for LIN, CAN and FlexRay™ Interfaces in Automotive Applications*”, Version 1.3, May 2012:
 - Conducted emissions @ 2 Mbps with Common-Mode Choke (CMC)
 - Direct Power Injection (DPI) @ 2 Mbps with CMC
- Meets SAE J2962/2 “*Communication Transceivers Qualification Requirements – CAN*”:
 - Passes radiated emissions at 2 Mbps without a CMC
- High Noise Immunity due to Differential Bus Implementation
- High ESD Protection on CANHx and CANLx, Meets IEC61000-4-2, up to ± 6 kV
- Available in 14-Lead SOIC

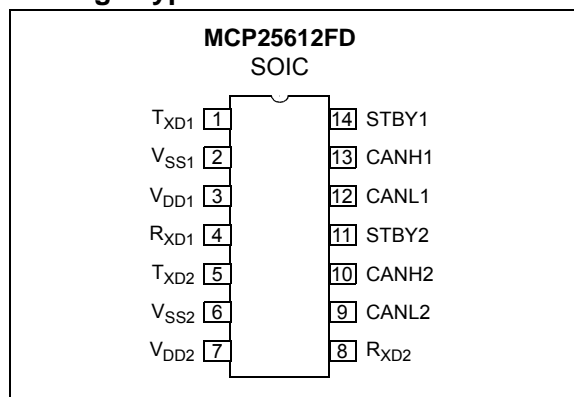
- Temperature Ranges:
 - Extended (E): -40°C to +125°C
 - High (H): -40°C to +150°C

Description

The MCP25612FD is a second generation, dual CAN FD transceiver from Microchip Technology Inc. It offers all of the features from two fully independent MCP2561FD CAN transceivers, except for the SPLIT pin. It ensures Loop Delay Symmetry in order to support the higher data rates required for CAN FD. The maximum propagation delay is improved to support a longer bus length.

The device meets the automotive requirements for CAN FD bit rates, low quiescent current, robust Electromagnetic Compatibility (EMC) and Electrostatic Discharge (ESD).

Package Types



Typical Applications

Automotive

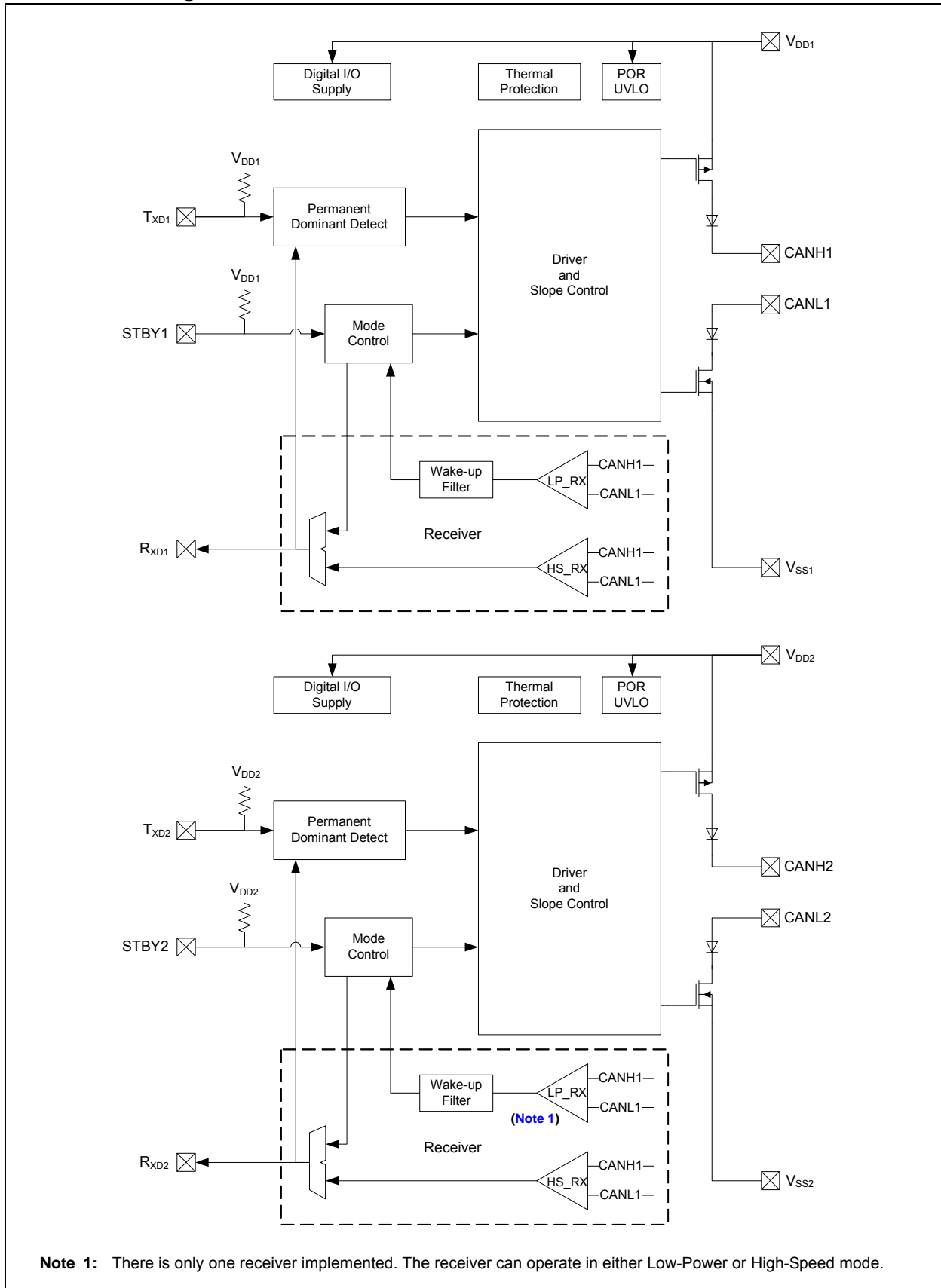
- Powertrain
- Body Control
- Gateway
- Chassis and Safety
- Infotainment

Industrial

- Factory Automation
- Gateway
- Server Backplanes
- Elevators
- Robotics

MCP25612FD

Device Block Diagram



1.0 DEVICE OVERVIEW

The MCP25612FD is a dual fully independent, CAN FD transceiver Fault tolerant device that serves as the interface between a CAN protocol controller and the physical bus. The MCP25612FD device provides differential transmit and receive capability for the CAN protocol controller, and is fully compatible with the ISO 11898-2 and ISO 11898-5 standards.

The Loop Delay Symmetry is ensured to support data rates up to 8 Mbps for CAN FD (Flexible Data-Rate). The maximum propagation delay was improved to support longer bus length.

Typically, each node in a CAN system must have a device to convert the digital signals generated by a CAN controller to signals suitable for transmission over the bus cabling (differential output). It also provides a buffer between the CAN controller and the high-voltage spikes that can be generated on the CAN bus by outside sources.

1.1 Mode Control Block

The MCP25612FD supports two modes of operation between the two CAN transceivers independently:

- Normal Mode
- Standby Mode

These modes are summarized in [Table 1-1](#).

1.1.1 NORMAL MODE

Normal mode is selected by applying low-level voltage to the STBYx pin. The driver block is operational and can drive the bus pins. The slopes of the output signals on CANHx and CANLx are optimized to produce minimal Electromagnetic Emissions (EME).

The high-speed differential receiver is active.

1.1.2 STANDBY MODE

The device may be placed in Standby mode by applying a high-level voltage to the STBYx pin. In Standby mode, the transmitter and the high-speed part of the receiver are switched off to minimize power consumption. The low-power receiver and the wake-up filter blocks are enabled to monitor the bus for activity. The Receive pin (R_{XDx}) will show a delayed representation of the CAN bus due to the wake-up filter.

The CAN controller gets interrupted by a negative edge on the R_{XDx} pin (Dominant state on the CAN bus). The CAN controller must put the MCP25612FD back into Normal mode, using the STBYx pin, in order to enable high-speed data communication.

The CAN bus wake-up function requires V_{DDx} to be in valid range.

TABLE 1-1: MODES OF OPERATION

Mode	STBYx Pin	R _{XDx} Pin	
		Low	High
Normal	Low	Bus is dominant	Bus is recessive
Standby	High	Wake-up request is detected	No wake-up request detected

1.2 Transmitter Function

The CAN bus has two states:

- Dominant state
- Recessive state

A Dominant state occurs when the differential voltage between CANHx and CANLx is greater than $V_{DIFFX(D)(I)}$. A Recessive state occurs when the differential voltage is less than $V_{DIFFX(R)(I)}$. The Dominant and Recessive states correspond to the Low and High state of the T_{XDX} input pin, respectively. However, a Dominant state initiated by another CAN node will override a Recessive state on the CAN bus.

1.3 Receiver Function

In Normal mode, the R_{XDX} output pin reflects the differential bus voltage between CANHx and CANLx. The Low and High states of the R_{XDX} output pin correspond to the Dominant and Recessive states of the CAN bus, respectively.

1.4 Internal Protection

CANHx and CANLx are protected against battery short circuits and electrical transients that can occur on the CAN bus. This feature prevents destruction of the transmitter output stage during such a Fault condition.

The device is further protected from excessive current loading by thermal shutdown circuitry that disables the output drivers when the junction temperature exceeds a nominal limit of +175°C. All other parts of the chip remain operational and the chip temperature is lowered due to the decreased power dissipation in the transmitter outputs. This protection is essential to protect against bus line short-circuit induced damage. The activation of the internal protection in one of the transceivers will not affect the other one since these are fully independent.

1.5 Permanent Dominant Detection

The MCP25612FD device prevents two conditions:

- Permanent dominant condition on T_{XDX}
- Permanent dominant condition on the bus

In Normal mode, if the MCP25612FD detects an extended Low state on the T_{XDX} input, it will disable the CANHx and CANLx output drivers in order to prevent the corruption of data on the CAN bus. The drivers will remain disabled until T_{XDX} goes to the High state.

In Standby mode, if the MCP25612FD detects an extended Dominant condition on the bus, it will set the R_{XDX} pin to the Recessive state. This allows the attached controller to go to Low-Power mode until the dominant issue is corrected. R_{XDX} is latched high until a Recessive state is detected on the bus and the wake-up function is enabled again.

Both conditions have a time-out of 1.25 ms (typical). This implies a maximum bit time of 69.44 μ s (14.4 kHz), allowing up to 18 consecutive dominant bits on the bus. The permanent dominant detection in one of the transceivers will not affect the other one since these are fully independent.

1.6 Power-on Reset (POR) and Undervoltage Detection

The MCP25612FD has undervoltage detection on the V_{DDX} supply pin. The typical undervoltage threshold is 4V.

When the device is powered on, CANHx and CANLx remain in a High-Impedance state until V_{DDX} exceeds its undervoltage level. Once powered on, CANHx and CANLx will enter a High-Impedance state if the voltage level at V_{DDX} drops below the undervoltage level, providing voltage brown-out protection during normal operation.

In Normal mode, the receiver output is forced to the Recessive state during an undervoltage condition on V_{DDX} . In Standby mode, the low-power receiver is only enabled when the V_{DDX} supply voltage rises above its undervoltage threshold. Once the threshold voltage is reached, the low-power receiver is no longer controlled by the POR comparator and remains operational down to about 2.5V on the V_{DDX} supply.

2.0 ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings†

V_{DDX}	7.0V
DC Voltage at T_{XDX} , R_{XDX} , $STBYx$ and V_{SSX}	-0.3V to $V_{DDX} + 0.3V$
DC Voltage at $CANHx$ and $CANLx$	-58V to +58V
Transient Voltage on $CANHx$, $CANLx$ (ISO-7637) (see Figure 2-4).....	-150V to +100V
Storage Temperature	-55°C to +150°C
Operating Ambient Temperature	-40°C to +150°C
Virtual Junction Temperature, T_{VJ} (IEC60747-1)	-40°C to +190°C
Soldering Temperature of Leads (10 seconds)	+300°C
ESD Protection on $CANHx$ and $CANLx$ Pins (IEC 61000-4-2); 330 Ω /150 pF; Unpowered; Contact Discharge.....	± 6 kV
ESD Protection on $CANHx$ and $CANLx$ Pins (IEC 801; Human Body Model); 1500 Ω /100 pF	± 8 kV
ESD Protection on All Other Pins (IEC 801; Human Body Model); 1500 Ω /100 pF.....	± 4 kV
ESD Protection on All Pins (IEC 801; Machine Model); 0 Ω /200 pF	$\pm 300V$
ESD Protection on All Pins (IEC 801; Charge Device Model).....	$\pm 750V$

† **NOTICE:** Stresses above those listed under “Maximum ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

2.2 Specifications

TABLE 2-1: DC ELECTRICAL SPECIFICATIONS

Electrical Characteristics: Extended (E): $T_{AMB} = -40^{\circ}C$ to $+125^{\circ}C$; High (H): $T_{AMB} = -40^{\circ}C$ to $+150^{\circ}C$; $V_{DDX} = 4.5V$ to $5.5V$, $R_{LX} = 60\Omega$, $C_{LX} = 100$ pF; unless otherwise specified.						
Characteristic	Sym	Min	Typ	Max	Units	Conditions
Supply (V_{DDX} Pin)						
Voltage Range	V_{DDX}	4.5	—	5.5		
Supply Current (per transceiver)	I_{DD}	—	5	10	mA	Recessive; $V_{TXDX} = V_{DDX}$
		—	45	70		Dominant; $V_{TXDX} = 0V$
Standby Current (per transceiver)	I_{DDS}	—	5	15	μA	
High Level of the POR Comparator	V_{PORH}	3.8	—	4.3	V	
Low Level of the POR Comparator	V_{PORL}	3.4	—	4.0	V	
Hysteresis of the POR Comparator	V_{PORD}	0.3	—	0.8	V	

Note 1: Characterized; not 100% tested.

2: -12V to 12V is ensured by characterization, tested from -2V to 7V.

MCP25612FD

TABLE 2-1: DC ELECTRICAL SPECIFICATIONS (CONTINUED)

Electrical Characteristics: Extended (E): T _{AMB} = -40°C to +125°C; High (H): T _{AMB} = -40°C to +150°C; V _{DDX} = 4.5V to 5.5V, R _{LX} = 60Ω, C _{LX} = 100 pF; unless otherwise specified.						
Characteristic	Sym	Min	Typ	Max	Units	Conditions
Bus Line Transmitter (CANHx, CANLx)						
CANHx, CANLx: Recessive Bus Output Voltage	V _{O(R)}	2.0	0.5 V _{DDX}	3.0	V	V _{TXDX} = V _{DDX} ; no load
CANHx, CANLx: Bus Output Voltage in Standby	V _{O(S)}	-0.1	0.0	+0.1	V	STBYx = V _{TXDX} = V _{DDX} ; no load
Recessive Output Current	I _{O(R)}	-5	—	+5	mA	-24V < V _{CAN} < +24V
CANHx: Dominant Output Voltage	V _{O(D)}	2.75	3.50	4.50	V	T _{TXDX} = 0; R _{LX} = 50 to 65Ω
CANLx: Dominant Output Voltage		0.50	1.50	2.25		R _{LX} = 50 to 65Ω
Symmetry of Dominant Output Voltage (V _{DDX} - V _{CANHX} - V _{CANLX})	V _{O(D)(M)}	-400	0	+400	mV	V _{TXDX} = V _{SSX} (Note 1)
Dominant: Differential Output Voltage	V _{O(DIFF)}	1.5	2.0	3.0	V	V _{TXDX} = V _{SSX} ; R _{LX} = 50 to 65Ω (see Figure 2-1 and Figure 2-3)
Recessive: Differential Output Voltage		-120	0	12	mV	V _{TXDX} = V _{DDX} (see Figure 2-1 and Figure 2-3)
		-500	0	50	mV	V _{TXDX} = V _{DDX} ; no load (see Figure 2-1 and Figure 2-3)
CANHx: Short-Circuit Output Current	I _{O(SC)}	-120	85	—	mA	V _{TXDX} = V _{SSX} ; V _{CANHX} = 0V; CANLx: Floating
		-100	—	—	mA	Same as above, but V _{DDX} = 5V; T _{AMB} = +25°C (Note 1)
CANLx: Short-Circuit Output Current		—	75	+120	mA	V _{TXDX} = V _{SSX} ; V _{CANLX} = 18V; CANHx: Floating
		—	—	+100	mA	Same as above, but V _{DDX} = 5V; T _{AMB} = +25°C (Note 1)
Bus Line Receiver (CANHx, CANLx)						
Recessive Differential Input Voltage	V _{DIFFX(R)(I)}	-1.0	—	+0.5	V	Normal mode; -12V < V _(CANHX, CANLX) < +12V (see Figure 2-5) (Note 2)
		-1.0	—	+0.4		Standby mode; -12V < V _(CANHX, CANLX) < +12V (see Figure 2-5) (Note 2)
Dominant Differential Input Voltage	V _{DIFFX(D)(I)}	0.9	—	V _{DDX}	V	Normal mode; -12V < V _(CANHX, CANLX) < +12V (see Figure 2-5) (Note 2)
		1.0	—	V _{DDX}		Standby mode; -12V < V _(CANHX, CANLX) < +12V (see Figure 2-5) (Note 2)

Note 1: Characterized; not 100% tested.

2: -12V to 12V is ensured by characterization, tested from -2V to 7V.

TABLE 2-1: DC ELECTRICAL SPECIFICATIONS (CONTINUED)

Electrical Characteristics: Extended (E): $T_{AMB} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$; High (H): $T_{AMB} = -40^{\circ}\text{C}$ to $+150^{\circ}\text{C}$; $V_{DDX} = 4.5\text{V}$ to 5.5V , $R_{LX} = 60\Omega$, $C_{LX} = 100\text{pF}$; unless otherwise specified.						
Characteristic	Sym	Min	Typ	Max	Units	Conditions
Bus Line Receiver (CANHx, CANLx) (Continued)						
Differential Receiver Threshold	$V_{TH(DIFF)}$	0.5	0.7	0.9	V	Normal mode; $-12\text{V} < V_{(CANHX, CANLX)} < +12\text{V}$ (see Figure 2-5) (Note 2)
		0.4	—	1.0		Standby mode; $-12\text{V} < V_{(CANHX, CANLX)} < +12\text{V}$ (see Figure 2-5) (Note 2)
Differential Input Hysteresis	$V_{HYS(DIFF)}$	50	—	200	mV	Normal mode (see Figure 2-5) (Note 1)
Common-Mode Input Resistance	R_{IN}	10	—	30	k Ω	(Note 1)
Common-Mode Resistance Matching	$R_{IN(M)}$	-1	0	+1	%	$V_{CANHX} = V_{CANLX}$ (Note 1)
Differential Input Resistance	$R_{IN(DIFF)}$	10	—	100	k Ω	(Note 1)
Common-Mode Input Capacitance	$C_{IN(CM)}$	—	—	20	pF	$V_{TXDX} = V_{DDX}$ (Note 1)
Differential Input Capacitance	$C_{IN(DIFF)}$	—	—	10		$V_{TXDX} = V_{DDX}$ (Note 1)
CANHx, CANLx: Input Leakage	I_{LI}	-5	—	+5	μA	$V_{DDX} = V_{TXDX} = V_{STBYX} = 0\text{V}$; $V_{CANHX} = V_{CANLX} = 5\text{V}$
Digital Input Pins (T_{XDX}, $STBYx$)						
High-Level Input Voltage	V_{IH}	$0.7 V_{DDX}$	—	$V_{DDX} + 0.3$	V	
Low-Level Input Voltage	V_{IL}	-0.3	—	$0.3 V_{DDX}$	V	
High-Level Input Current	I_{IH}	-1	—	+1	μA	
T_{XDX} : Low-Level Input Current	$I_{IL(TXDX)}$	-270	-150	-30	μA	
$STBYx$: Low-Level Input Current	$I_{IL(STBYX)}$	-30	—	-1	μA	
Receive Data Output (R_{XDX})						
High-Level Output Voltage	V_{OHX}	$V_{DDX} - 0.4$	—	—	V	$I_{OH} = -2\text{mA}$; typical -4 mA
Low-Level Output Voltage	V_{OLX}	—	—	0.4	V	$I_{OL} = 4\text{mA}$; typical 8 mA
Thermal Shutdown						
Shutdown Junction Temperature	$T_{J(SD)}$	165	175	185	$^{\circ}\text{C}$	$-12\text{V} < V_{(CANHX, CANLX)} < +12\text{V}$ (Note 1)
Shutdown Temperature Hysteresis	$T_{J(HYST)}$	20	—	30	$^{\circ}\text{C}$	$-12\text{V} < V_{(CANHX, CANLX)} < +12\text{V}$ (Note 1)

Note 1: Characterized; not 100% tested.

2: -12V to 12V is ensured by characterization, tested from -2V to 7V.

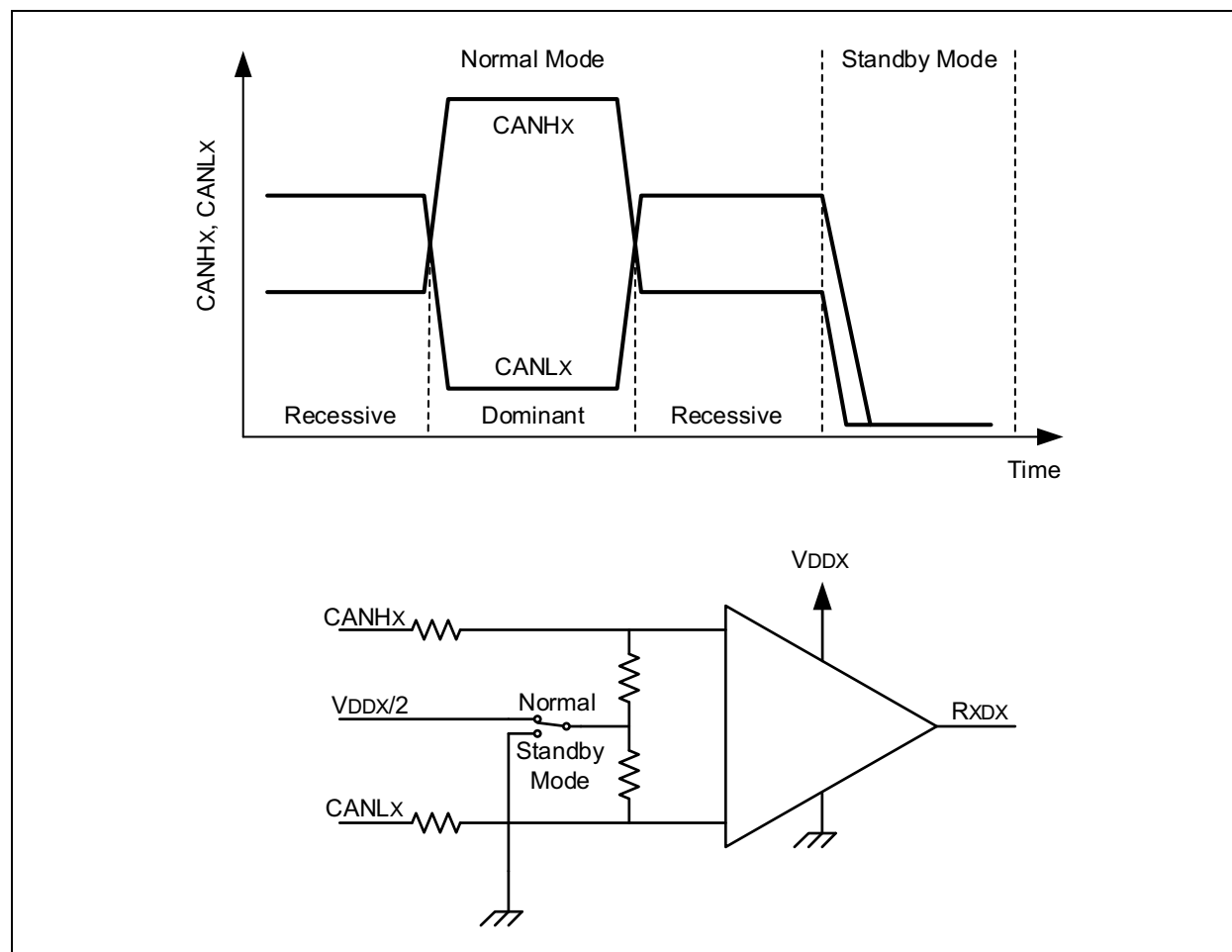


FIGURE 2-1: Physical Bit Representation and Simplified Bias Implementation.

TABLE 2-2: AC ELECTRICAL SPECIFICATIONS

Electrical Characteristics: Extended (E): $T_{AMB} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$; High (H): $T_{AMB} = -40^{\circ}\text{C}$ to $+150^{\circ}\text{C}$; $V_{DDX} = 4.5\text{V}$ to 5.5V , $R_{LX} = 60\Omega$, $C_{LX} = 100\text{ pF}$; unless otherwise specified.							
Param. No.	Sym	Characteristic	Min	Typ	Max	Units	Conditions
1	t_{BIT}	Bit Time	0.125	—	69.44	μs	
2	f_{BIT}	Bit Frequency	14.4	—	8000	kHz	
3	$t_{TXDX-BUSON}$	Delay T_{XDX} Low to Bus Dominant	—	65	—	ns	(Note 1)
4	$t_{TXDX-BUSOFF}$	Delay T_{XDX} High to Bus Recessive	—	90	—	ns	(Note 1)
5	$t_{BUSON-RXDX}$	Delay Bus Dominant to R_{XDX}	—	60	—	ns	(Note 1)
6	$t_{BUSOFF-RXDX}$	Delay Bus Recessive to R_{XDX}	—	65	—	ns	(Note 1)
7	$t_{TXDX-RXDX}$	Propagation Delay T_{XDX} to R_{XDX}	—	90	120	ns	
			—	120	180	ns	$R_{LX} = 120\Omega$, $C_{LX} = 200\text{ pF}$ (Note 1)
8a	$t_{BIT(RXDX),2M}$	Recessive Bit Time on $R_{XDX} - 2\text{ Mbps}$, Loop Delay Symmetry	450	485	550	ns	$t_{BIT(TXDX)} = 500\text{ ns}$ (see Figure 2-10)
			400	460	550	ns	$t_{BIT(TXDX)} = 500\text{ ns}$ (see Figure 2-10); $R_{LX} = 120\Omega$, $C_{LX} = 200\text{ pF}$ (Note 1)
8b	$t_{BIT(RXDX),5M}$	Recessive Bit Time on $R_{XDX} - 5\text{ Mbps}$, Loop Delay Symmetry	160	185	220	ns	$t_{BIT(TXDX)} = 200\text{ ns}$ (see Figure 2-10)
8c	$t_{BIT(RXDX),8M}$	Recessive Bit Time on $R_{XDX} - 8\text{ Mbps}$, Loop Delay Symmetry	85	105	140	ns	$t_{BIT(TXDX)} = 120\text{ ns}$ (see Figure 2-10) (Note 1)
9	$t_{FLTR(WAKE)}$	Delay Bus Dominant to R_{XDX} (Standby mode)	0.5	1	4	μs	Standby mode
10	t_{WAKE}	Delay Standby to Normal Mode	5	25	40	μs	Negative edge on $STBYx$
11	t_{PDT}	Permanent Dominant Detect Time	—	1.25	—	ms	$T_{XDX} = 0\text{V}$
12	t_{PDTR}	Permanent Dominant Timer Reset	—	100	—	ns	The shortest Recessive pulse on T_{XDX} or CAN bus to reset Permanent Dominant Timer

Note 1: Characterized, not 100% tested.

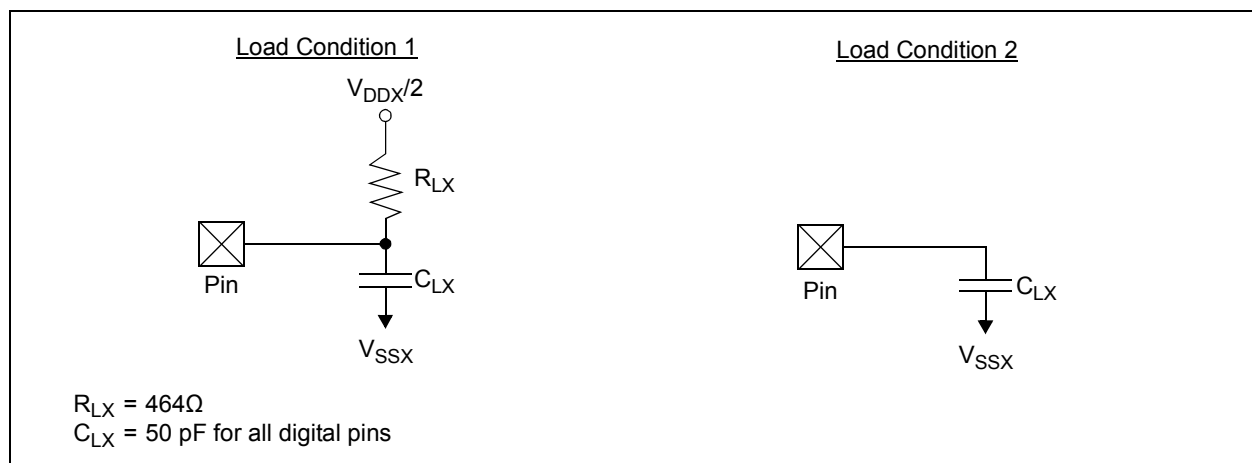


FIGURE 2-2: Test Load Conditions.

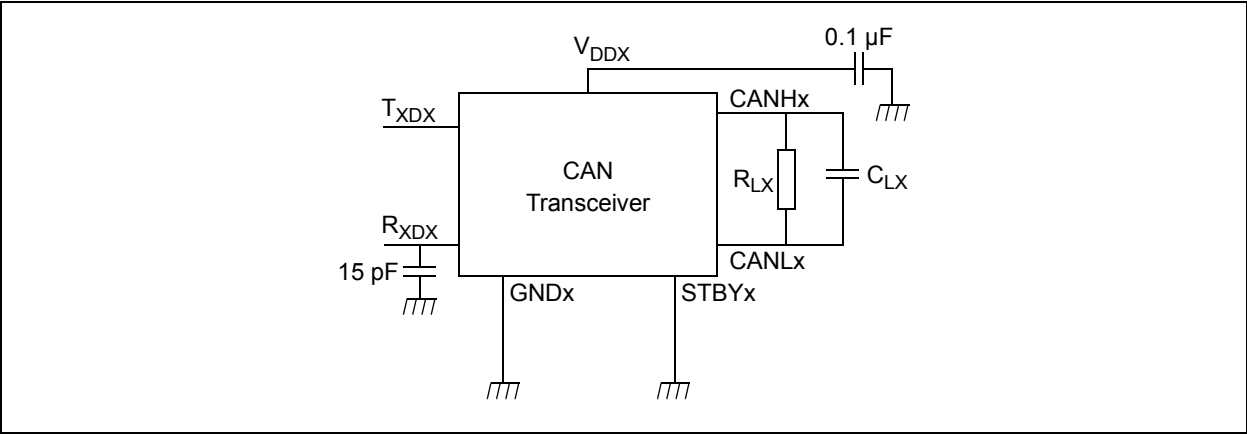


FIGURE 2-3: Test Circuit for Electrical Characteristics.

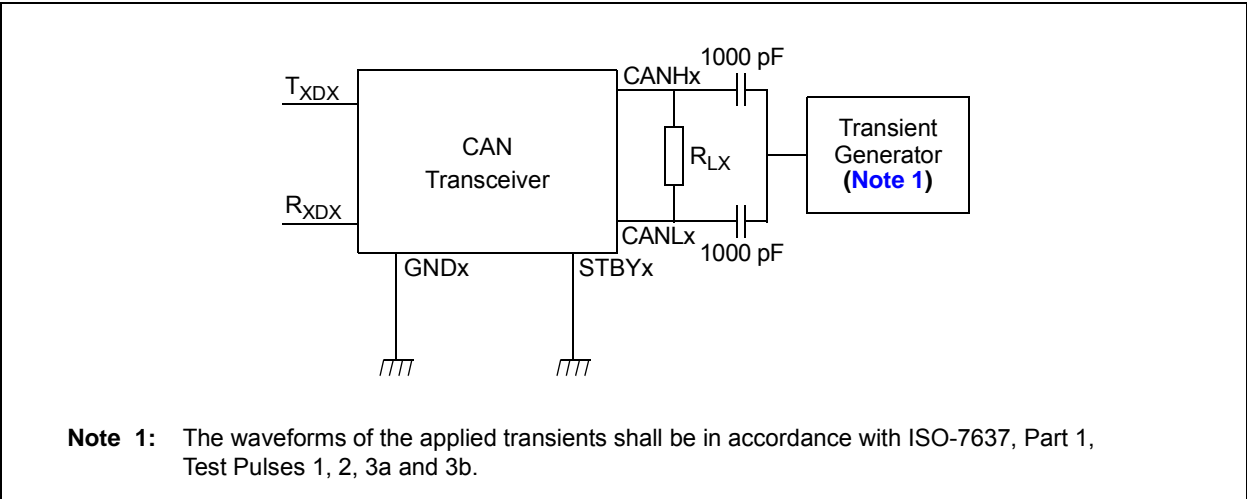


FIGURE 2-4: Test Circuit for Automotive Transients.

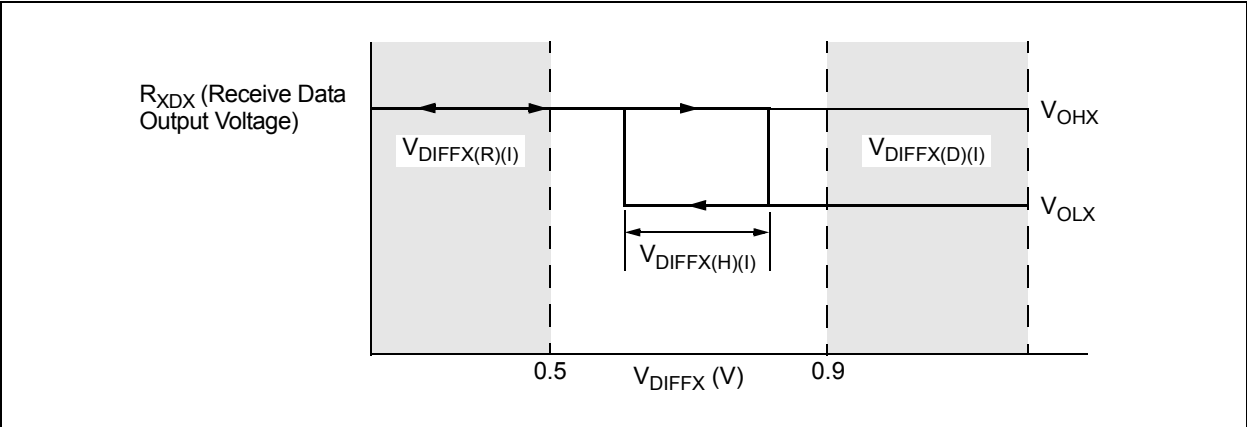


FIGURE 2-5: Hysteresis of the Receiver.

2.3 Terms and Definitions

A number of terms are defined in ISO-11898 that are used to describe the electrical characteristics of a CAN transceiver device. These terms and definitions are summarized in this section.

2.3.1 BUS VOLTAGE

V_{CANLX} and V_{CANHX} denote the voltages of the bus line wires, CANLx and CANHx, relative to the ground of each individual CAN node.

2.3.2 COMMON-MODE BUS VOLTAGE RANGE

Boundary voltage levels of V_{CANLX} and V_{CANHX} , with respect to ground, for which proper operation will occur if up to the maximum number of CAN nodes are connected to the bus.

2.3.3 DIFFERENTIAL INTERNAL CAPACITANCE, C_{DIFF} (OF A CAN NODE)

Capacitance seen between CANLx and CANHx during the Recessive state, when the CAN node is disconnected from the bus (see [Figure 2-6](#)).

2.3.4 DIFFERENTIAL INTERNAL RESISTANCE, R_{DIFF} (OF A CAN NODE)

Resistance seen between CANLx and CANHx, during the Recessive state, when the CAN node is disconnected from the bus (see [Figure 2-6](#)).

2.3.5 DIFFERENTIAL VOLTAGE, V_{DIFFX} (OF CAN BUS)

Differential voltage of the two-wire CAN bus value:
 $V_{DIFFX} = V_{CANHX} - V_{CANLX}$.

2.3.6 INTERNAL CAPACITANCE, C_{IN} (OF A CAN NODE)

Capacitance seen between CANLx (or CANHx) and ground, during the Recessive state, when the CAN node is disconnected from the bus (see [Figure 2-6](#)).

2.3.7 INTERNAL RESISTANCE, R_{IN} (OF A CAN NODE)

Resistance seen between CANLx (or CANHx) and ground, during the Recessive state, when the CAN node is disconnected from the bus (see [Figure 2-6](#)).

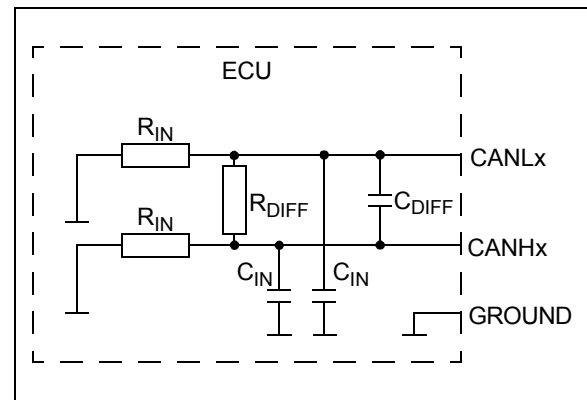


FIGURE 2-6: Physical Layer Definitions.

2.4 Timing Diagrams and Specifications

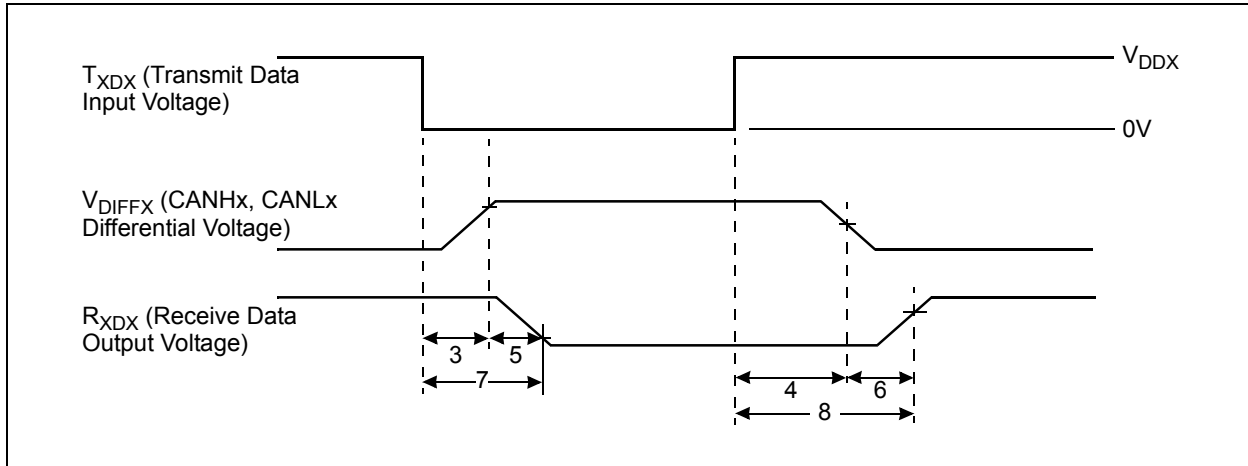


FIGURE 2-7: Timing Diagram for AC Characteristics.

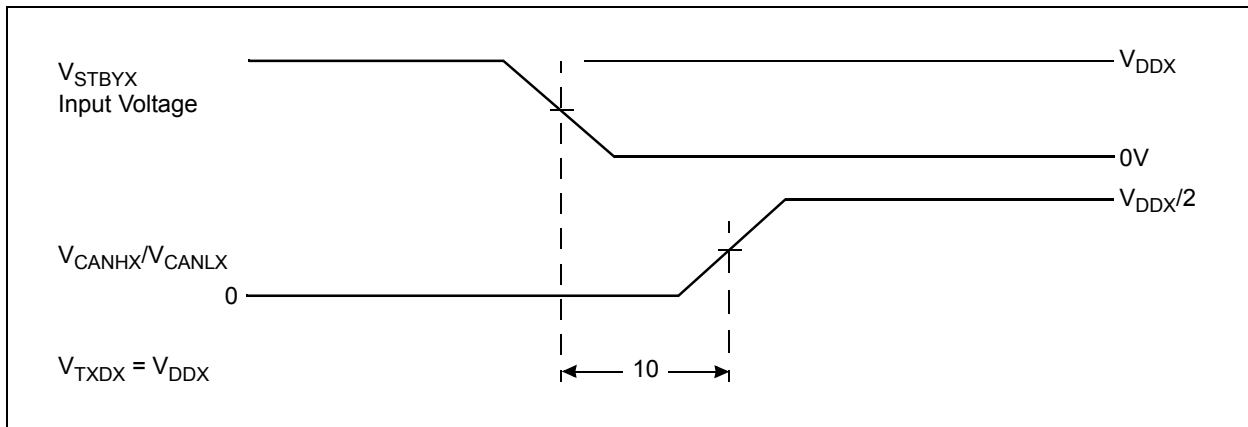


FIGURE 2-8: Timing Diagram for Wake-up from Standby.

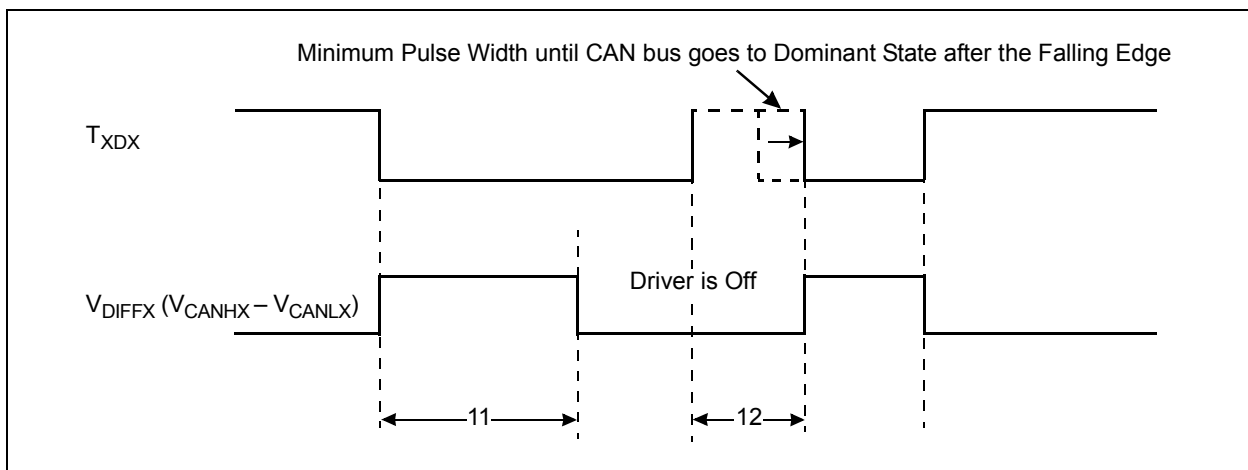


FIGURE 2-9: Permanent Dominant Timer Reset Detect.

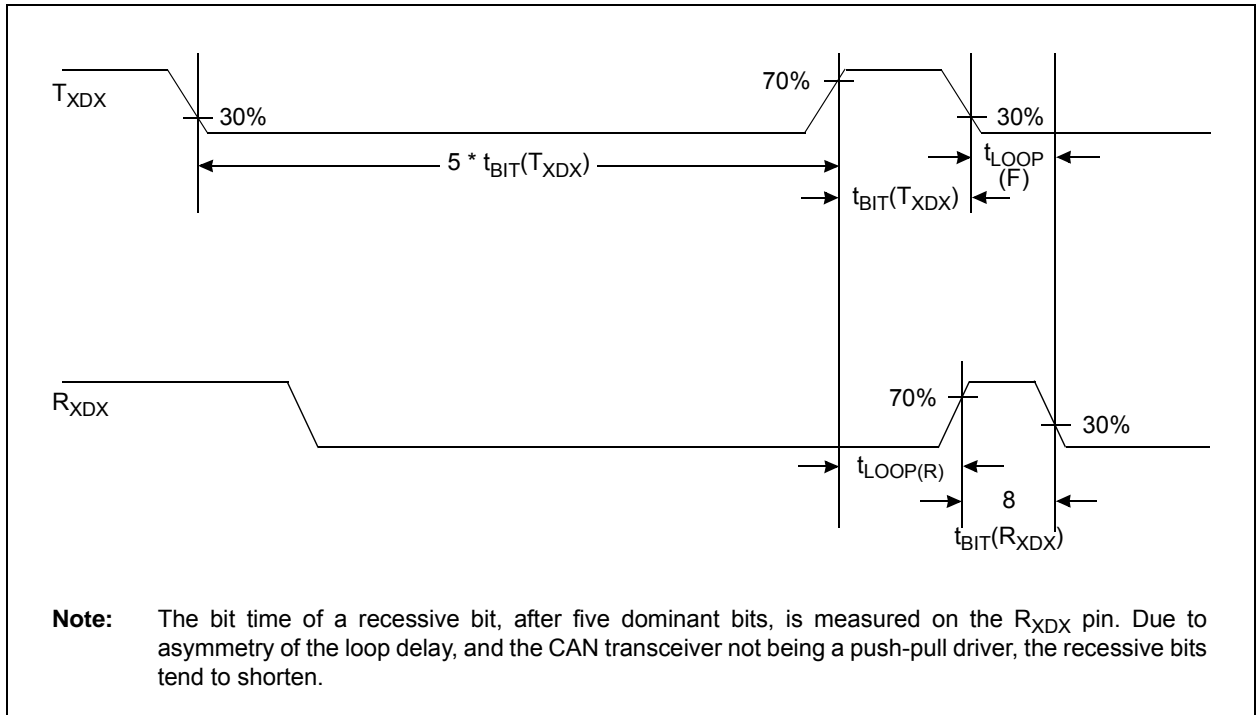


FIGURE 2-10: Timing Diagram for Loop Delay Symmetry.

TABLE 2-3: THERMAL SPECIFICATIONS

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Temperature Ranges						
Specified Temperature Range	T_A	-40	—	+125	°C	
		-40	—	+150		
Operating Temperature Range	T_A	-40	—	+150	°C	
Storage Temperature Range	T_A	-55	—	+150	°C	
Thermal Package Resistance						
Thermal Resistance, 14L-SOIC	θ_{JA}	—	90.8	—	°C/W	

MCP25612FD

3.0 PIN DESCRIPTIONS

Table 3-1 describes the MCP25612FD device pinout.

TABLE 3-1: MCP25612FD PIN FUNCTIONS

SOIC	Pin Name	Pin Type	Pin Function
1	T _{XD1}	I	Transmit Data Input
2	V _{SS1}	Power	Ground
3	V _{DD1}	Power	Transceiver Supply Voltage
4	R _{XD1}	O	Receive Data Output
5	T _{XD2}	I	Transmit Data Input
6	V _{SS2}	Power	Ground
7	V _{DD2}	Power	Transceiver Supply Voltage
8	R _{XD2}	O	Receive Data Output
9	CANL2	I/O	CAN Low-Level Bus Line
10	CANH2	I/O	CAN High-Level Bus Line
11	STBY2	I	Standby Mode Input (active-high)
12	CANL1	I/O	CAN Low-Level Bus Line
13	CANH1	I/O	CAN High-Level Bus Line
14	STBY1	I	Standby Mode Input (active-high)

3.1 Transmitter Data Input Pin (T_{XDx})

The CAN transceivers drive the differential output pins, CANHx and CANLx, according to T_{XDx}. T_{XDx} is usually connected to the transmitter data output of the CAN controller device. When T_{XDx} is low, CANHx and CANLx are in the Dominant state. When T_{XDx} is high, CANHx and CANLx are in the Recessive state, provided that another CAN node is not driving the CAN bus with a Dominant state. T_{XDx} is connected to an internal pull-up resistor (nominal 33 kΩ) to V_{DDx}.

3.2 Ground Supply Pin (V_{SSx})

Ground supply pin.

3.3 Supply Voltage Pin (V_{DDx})

Positive supply voltage pin. Supplies the transmitter and receiver, including the wake-up receiver.

3.4 Receiver Data Output Pin (R_{XDx})

R_{XDx} is a CMOS-compatible output that drives high or low, depending on the differential signals on the CANHx and CANLx pins, and is usually connected to the receiver data input of the CAN controller device. R_{XDx} is high when the CAN bus is in the Recessive state and low in the Dominant state. R_{XDx} is supplied by V_{DDx}.

3.5 CAN Low Pin (CANLx)

The CANLx output drives the low side of the CAN differential bus. This pin is also tied internally to the receive input comparator. CANLx disconnects from the bus when MCP25612FD is not powered.

3.6 CAN High Pin (CANHx)

The CANHx output drives the high side of the CAN differential bus. This pin is also tied internally to the receive input comparator. CANHx disconnects from the bus when MCP25612FD is not powered.

3.7 Standby Mode Input Pin (STBYx)

This pin selects between Normal or Standby mode. In Standby mode, the transmitter and high-speed receiver are turned off; only the low-power receiver and wake-up filter are active. STBYx is connected to an internal MOS pull-up resistor to V_{DDx}. The typical value is 660 kΩ.

4.0 TYPICAL APPLICATIONS

In order to meet some EMC/EMI requirements, a Common-Mode Choke (CMC) may be needed for data rates greater than 1 Mbps.

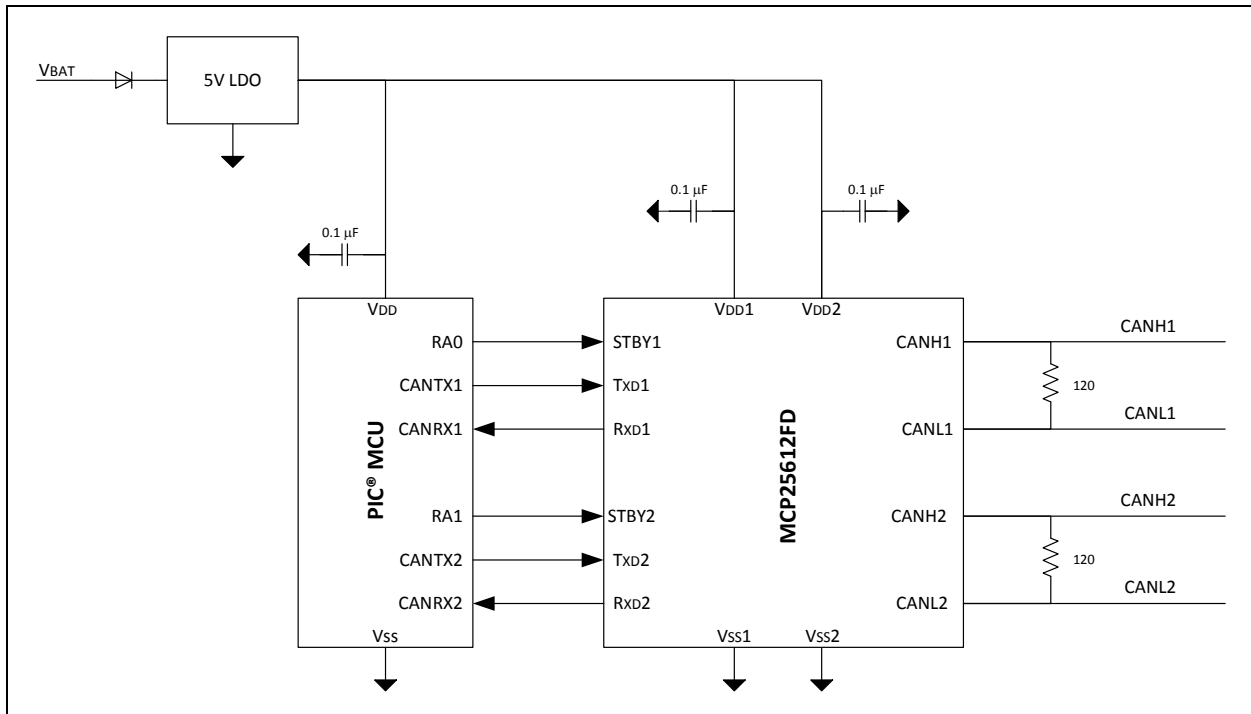


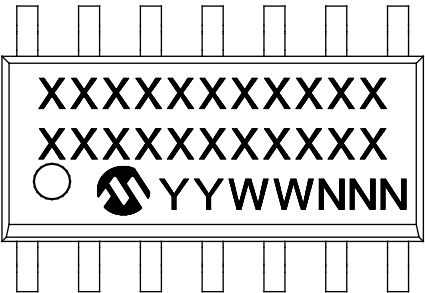
FIGURE 4-1: MCP25612FD Application.

MCP25612FD

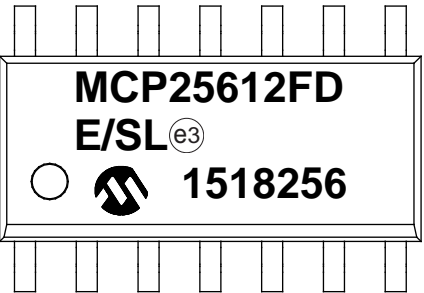
5.0 PACKAGING INFORMATION

5.1 Package Marking Information

14-Lead SOIC (3.90 mm)



Example



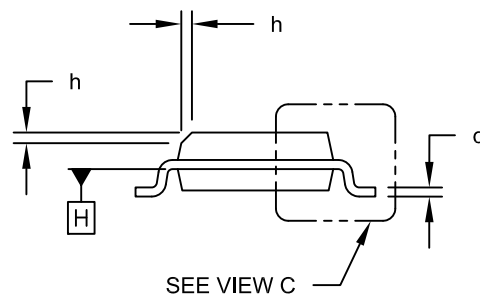
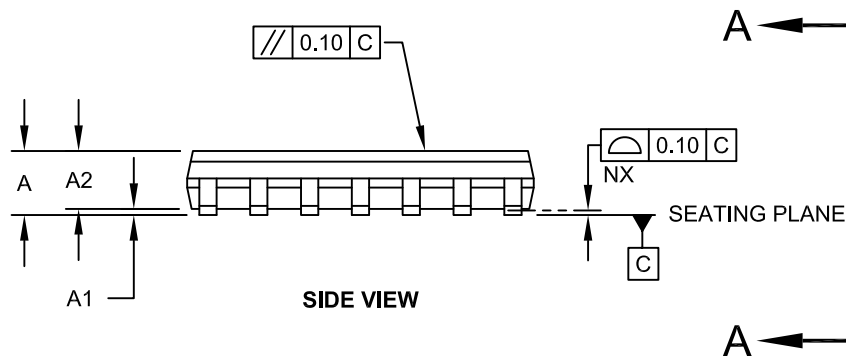
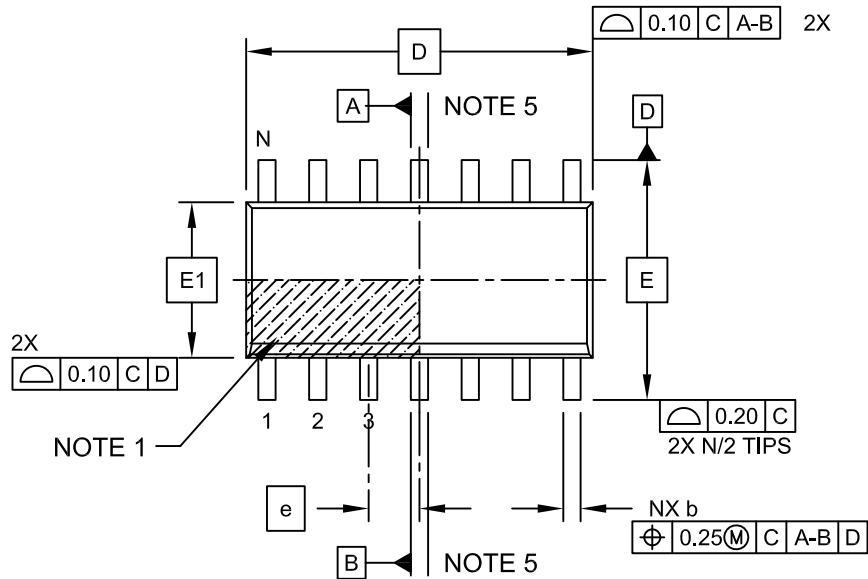
Legend:	XX...X	Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information.

5.2 Package Details

14-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

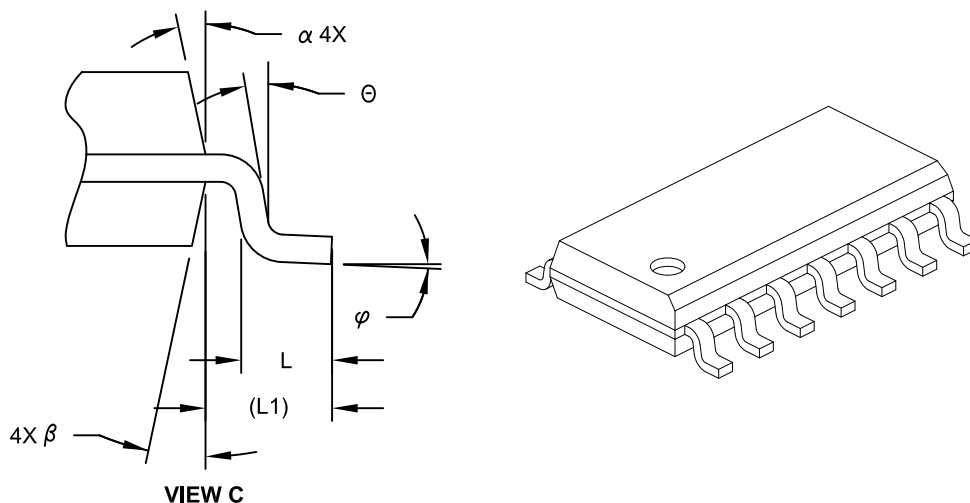


Microchip Technology Drawing No. C04-065C Sheet 1 of 2

MCP25612FD

14-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	14		
Pitch	e	1.27 BSC		
Overall Height	A	-	-	1.75
Molded Package Thickness	A2	1.25	-	-
Standoff §	A1	0.10	-	0.25
Overall Width	E	6.00 BSC		
Molded Package Width	E1	3.90 BSC		
Overall Length	D	8.65 BSC		
Chamfer (Optional)	h	0.25	-	0.50
Foot Length	L	0.40	-	1.27
Footprint	L1	1.04 REF		
Lead Angle	Θ	0°	-	-
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.10	-	0.25
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

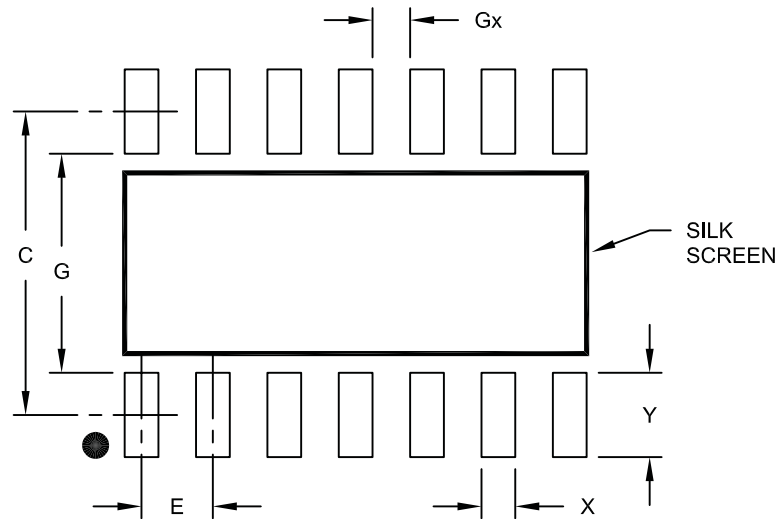
Notes:

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- § Significant Characteristic
- Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF: Reference Dimension, usually without tolerance, for information purposes only.
- Datums A & B to be determined at Datum H.

Microchip Technology Drawing No. C04-065C Sheet 2 of 2

14-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E	1.27 BSC		
Contact Pad Spacing	C		5.40	
Contact Pad Width	X			0.60
Contact Pad Length	Y			1.50
Distance Between Pads	Gx	0.67		
Distance Between Pads	G	3.90		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2065A

MCP25612FD

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (June 2015)

Original release of this document.

MCP25612FD

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact the factory or one of the sales offices listed on the back page.

<u>PART NO.</u>	<u>-X</u>	<u>/XX</u>
Device	Temperature Range	Package
Device: MCP25612FD: Dual CAN FD Transceiver MCP25612FDT: Dual CAN FD Transceiver (Tape and Reel)	Temperature Range: E = -40°C to +125°C (Extended) H = -40°C to +150°C (High)	Package: SL = 14-Lead Plastic Small Outline - Narrow, 3.90 mm Body
Examples: a) MCP25612FD-E/SL: Extended Temperature, 14LD SOIC package b) MCP25612FDT-E/SL: Tape and Reel, Extended Temperature, 14LD SOIC package c) MCP25612FD-H/SL: High Temperature, 14LD SOIC package. d) MCP25612FDT-H/SL: Tape and Reel, High Temperature, 14LD SOIC package		

MCP25612FD

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, flexPWR, JukeBlox, KEELOQ, KEELOQ logo, Klear, LANCheck, MediaLB, MOST, MOST logo, MPLAB, OptoLyzer, PIC, PICSTART, PIC³² logo, RightTouch, SpyNIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

The Embedded Control Solutions Company and mTouch are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, ECAN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, KlearNet, KlearNet logo, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, RightTouch logo, REAL ICE, SQI, Serial Quad I/O, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2015, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-63277-484-2

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO/TS 16949 ==

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://www.microchip.com/support>
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110

Canada - Toronto
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2943-5100
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Dongguan
Tel: 86-769-8702-9880

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

ASIA/PACIFIC

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880-3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7828

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Dusseldorf
Tel: 49-2129-3766400

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Pforzheim
Tel: 49-7231-424750

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Venice
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Poland - Warsaw
Tel: 48-22-3325737

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.