SIEMENS

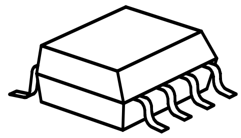
CAN-Transceiver TLE 6250

Target Data Sheet

1 Overview

1.1 Features

- CAN data transmission rate up to 1 Mbaud
- Compatible to ISO/DIS 11898
- Suitable for 12 V and 24 V applications
- Wide common mode range for immunity to EMI
- Version for 5V and 3.3V micro controllers
- No reverse currents from bus via an unpowered node
- Short circuit proof to ground and battery
- Overtemperatur protection



P-DSO-8-3

Type	Ordering Code	Package
TLE 6250 G	on request	P-DSO-8-3
TLE 6250 G V33	on request	P-DSO-8-3

Description

The CAN-transceiver TLE 6250 is a monolithic integrated circuit in a P-DSO-8-3 package for high speed differential mode data transmission in automotive and industrial applications. It works as an interface between the CAN protocol controller and the physical differential bus in both, 12 V and 24 V systems.

There are two versions available: one for 5 V logic and the other one for 3.3 V logic requiring additional supply via the V_{33V} pin. The IC can be set to stand-by mode via a control input.

The IC is based on the Siemens Power Technology SPT® which allowes bipolar and CMOS control cricuitry in accordance with DMOS power devices existing on the same monolithic circuitry.

The TLE 6250 is designed to withstand the severe conditions of automotive applications.

1.2 Pin Configuration (top view)

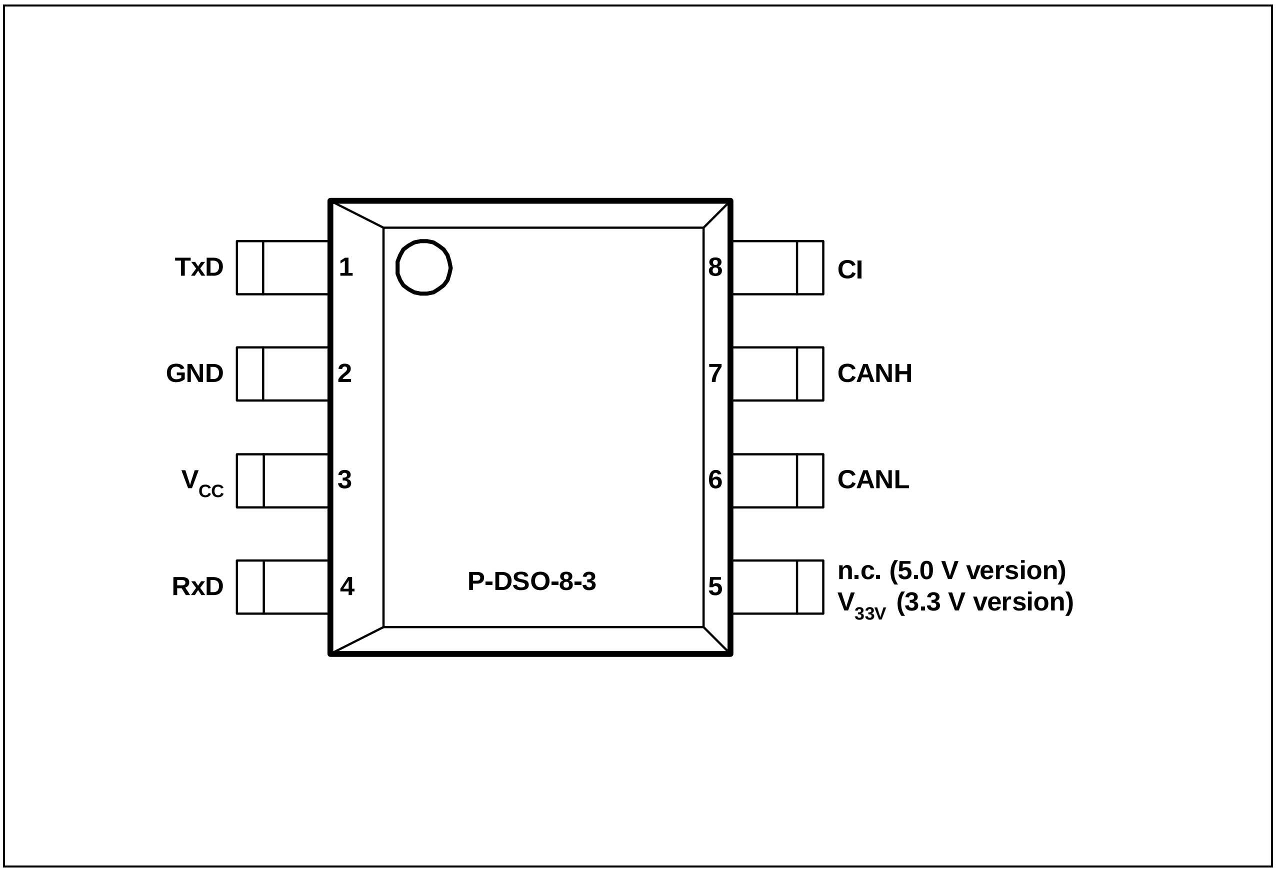


Figure 1

1.3 Pin Definitions and Functions

Pin No.	Symbol	Function
1	TxD	**CAN transmit data input;** LOW in dominant state
2	GND	**Ground;**
3	V_{CC}	**5V Supply;**
4	RxD	**CAN receive data output;** LOW in dominant state, integrated pull up
5	n.c. V_{33V}	**n.c.;** not connected for 5.0 V version **3.3 V logic supply;** (3.3 V version) for applications using 3.3 V microcontroller
6	CANL	**Low line input;** LOW in dominant state
7	CANH	**High line output;** HIGH in dominant state
8	CI	**Control input;** set HIGH for stand-by mode

1.4 Functional Block Diagram

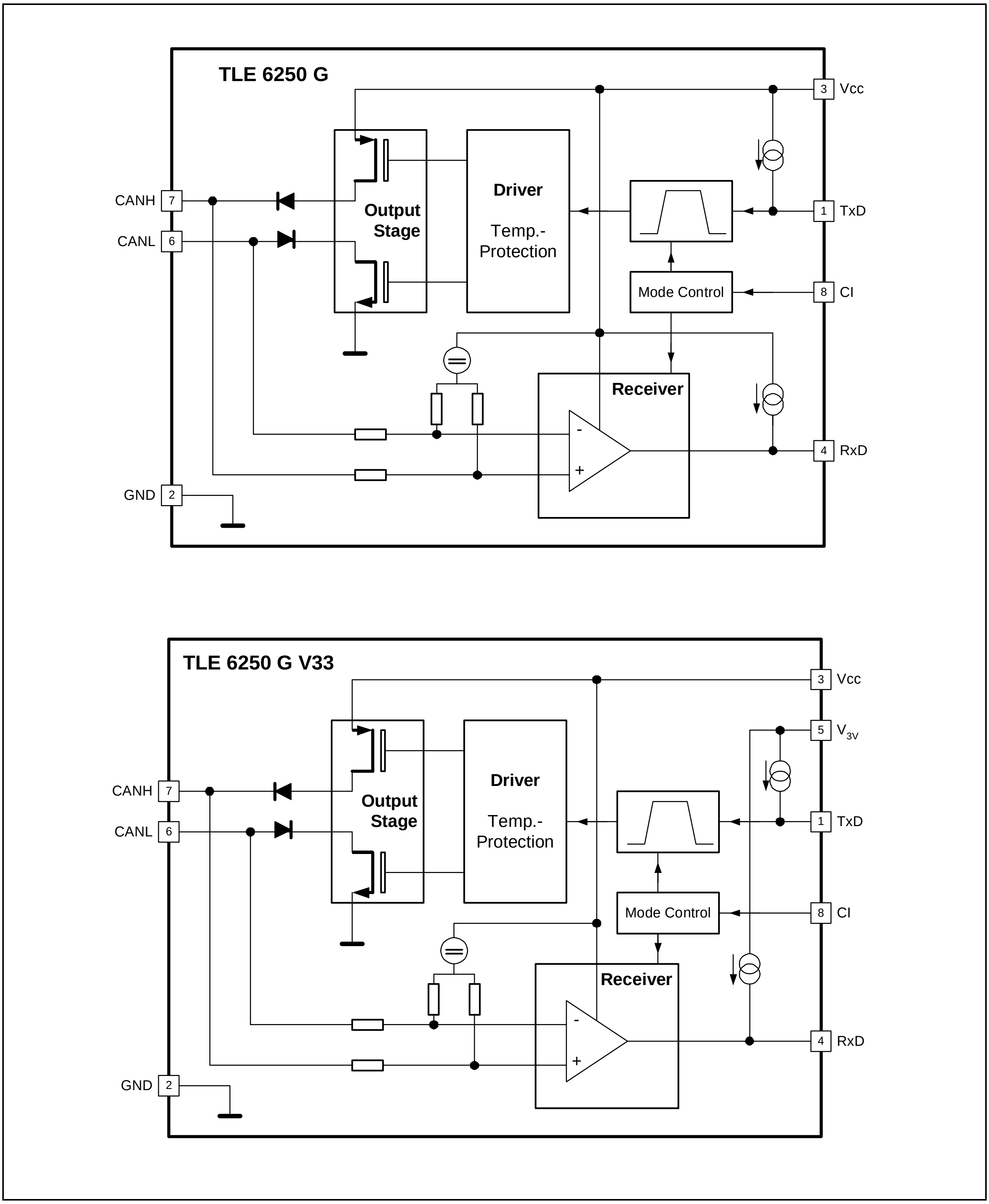


Figure 2

2 Electrical Characteristics

2.1 Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Voltages					
Supply voltage	V_{CC}	-0.3	6	V	
3.3V supply	V_{33V}	-0.3	6	V	3.3 V version
CAN input voltage (CANH, CANL)	$V_{CANH/L}$	-20	40	V	
Logic voltages at CI, TxD, RxD	V_I	-0.3	V_{CC} +0.3	V	0 V < V_{CC} < 5.5 V
Electrostatic discharge voltage	V_{ESD}	-2	2	kV	human body model (100 pF via 1.5 kΩ)
Currents					
Temperatures					
Junction temperature	T_j	-40	150	°C	–

Note: Maximum ratings are absolute ratings; exceeding any one of these values may cause irreversible damage to the integrated circuit.

2.2 Operating Range

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Supply voltage	V_{CC}	4.5	5.5	V	
3V supply voltage	V_{33V}	3.0	3.6	V	3.3 V version
Junction temperature	T_j	– 40	150	°C	–

Thermal Resistances

Junction ambient	R_{thj-a}	–	200	K/W	–

2.3 Electrical Characteristics

4.5 V < V_{CC} < 5.5 V; (3.0 V < V_{33V} < 3.6 V for 3.3 V version); R_L = 60 Ω; V_{CI} > $V_{CI,ON}$; –40 °C < T_j < 150 °C; all voltages with respect to ground; positive current flowing into pin; unless otherwise specified.

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Current Consumption						
Current consumption	I_{CC}			15	mA	recessive state; V_{TxD} = 4 V
Current consumption	I_{CC}			80	mA	dominant state; V_{TxD} = 1 V
Current consumption	I_{33V}			2	mA	(3.3V version only)
Current consumption	$I_{CC,stb}$		200		µA	stand-by mode
Current consumption	$I_{CC+33V,stb}$		200		µA	stand-by mode (3.3V version only)
Receiver Output R×D						
HIGH level output voltage $V_{diff} = V_{CANH} - V_{CANL}$	V_{OH}	0.8× V_{CC}		V_{CC}	V	I_{RX} = – 300 µA; V_{diff} < 0,4 V
		0.9× V_{33V}		V_{33V}	V	3.3 V version I_{RX} = – 300 µA; V_{diff} < 0,4 V
LOW level output voltage $V_{diff} = V_{CANH} - V_{CANL}$	V_{OL}	0		0.2× V_{CC}	V	I_{RX} = 1 mA; V_{diff} > 1 V
		0		0.2× V_{33V}	V	3.3 V version I_{RX} = 1 mA; V_{diff} > 1 V
Bus receiver						
Differential receiver threshold voltage $V_{diff} = V_{CANH} - V_{CANL}$	V_{diff}	0.1× V_{CC}		0.18× V_{CC}	V	–2 V < (V_{CANH},V_{CANL}) < 7 V
Differential receiver hysteresis	$V_{diff (hys)}$		200		mV	
CANH, CANL input resistance	R_i		20		kΩ	recessive state
Differential input resistance	R_{diff}		40		kΩ	recessive state

2.3 Electrical Characteristics (cont'd)

4.5 V < V_{CC} < 5.5 V; (3.0 V < V_{33V} < 3.6 V for 3.3 V version); R_L = 60 Ω; $V_{CI} > V_{CI,ON}$; –40 °C < T_j < 150 °C; all voltages with respect to ground; positive current flowing into pin; unless otherwise specified.

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Transmission Input T×D						
HIGH level input voltage threshold	V_{IH}	0.7 × V_{CC}	–	V_{CC} + 0.3	V	recessive state; 5.0 V version
		0.7 × V_{33V}	–	V_{33V} + 0.3	V	recessive state; 3.3 V version
LOW level input voltage threshold	V_{IL}	-0.3	–	0.3 × V_{CC}	V	dominant state
		-0.3	–	0.3 × V_{33V}	V	dominant state 3.3 V version
HIGH level input current	I_{IH}	-200		-30	µA	V_{TxD} = 4 V
LOW level input current	I_{IL}	-800		-100	µA	V_{TxD} = 1 V
Bus transmitter						
CANL/CANH recessive output voltage	$V_{CANL/H}$	0.4x V_{CC}		0.6x V_{CC}	V	V_{TxD} = 4 V;
CANH, CANL recessive output voltage difference $V_{bus\Delta} = V_{CANH} - V_{CANL}$	$V_{bus\Delta}$	–500		50	mV	V_{TxD} = 4 V;
CANL dominant output voltage	V_{CANL}			2.0	V	V_{TxD} = 1 V;
CANH dominant output voltage	V_{CANH}	3.0			V	V_{TxD} = 1 V; 4.75 V < V_{CC} < 5.5 V
CANH, CANL dominant output voltage difference $V_{bus\Delta} = V_{CANH} - V_{CANL}$	$V_{bus\Delta}$	1.5		3.0	V	V_{TxD} = 1 V; 4.75 V < V_{CC} < 5.5 V
CANL short circuit current	I_{CANLsc}		140		mA	$V_{CANLshort}$ = 18 V
			180		mA	$V_{CANLshort}$ = 36 V
CANH short circuit current	I_{CANHsc}		-140		mA	$V_{CANLshort}$ = -5 V

2.3 Electrical Characteristics (cont'd)

4.5 V < V_{CC} < 5.5 V; (3.0 V < V_{33V} < 3.6 V for 3.3 V version); R_L = 60 Ω; $V_{CI} > V_{CI,ON}$; –40 °C < T_j < 150 °C; all voltages with respect to ground; positive current flowing into pin; unless otherwise specified.

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
CANH leakage current	I_{CANHl}	-10			µA	V_{CC} = 0 V, -2 V < V_{CANH} < 7 V, T_j < 85 °C
CANL leakage current	I_{CANLl}			10	µA	V_{CC} = 0 V, -2 V < V_{CANL} < 7 V, T_j < 85 °C

Mode control input (pin CI)

Parameter	Symbol	min.	typ.	max.	Unit	Test Condition
High input voltage	$V_{CI,ON}$	0.75x V_{CC}			V	stand-by mode
High input current	$I_{CI,ON}$		5		µA	stand-by mode

Dynamic CAN-Transceiver Characteristics

Parameter	Symbol	min.	typ.	max.	Unit	Test Condition
Propagation delay TxD-to-RxD LOW (recessive to dominant)	$t_{d(L),TR}$		150	280	ns	C_L = 47pF; R_L = 60Ω; V_{CC} = 5V; C_{RxD} = 20pF
Propagation delay TxD-to-RxD HIGH (dominanat to recessive)	$t_{d(H),TR}$		150	280	ns	C_L = 47 pF; R_L = 60 Ω; V_{CC} = 5 V; C_{RxD} = 20pF
Propagation delay TxD LOW to bus dominat	$t_{d(L),T}$		50		ns	C_L = 47 pF; R_L = 60 Ω; V_{CC} = 5 V
Propagation delay TxD HIGH to bus recessive	$t_{d(H),T}$		50		ns	C_L = 47 pF; R_L = 60 Ω; V_{CC} = 5 V
Propagation delay bus dominat to RxD LOW	$t_{d(L),R}$		100		ns	C_L = 47 pF; R_L = 60 Ω; V_{CC} = 5V; C_{RxD} = 20pF
Propagation delay bus recessive to RxD HIGH	$t_{d(H),R}$		100		ns	C_L = 47 pF; R_L = 60 Ω; V_{CC} = 5 V; C_{RxD} = 20pF

Thermal Shutdown (junction temperature)

Parameter	Symbol	min.	typ.	max.	Unit	Test Condition
Thermal shutdown temp.	T_{jSD}	150	170	185	°C	–
Thermal shutdown hyst.	ΔT	–	10	–	K	–

3 Diagrams

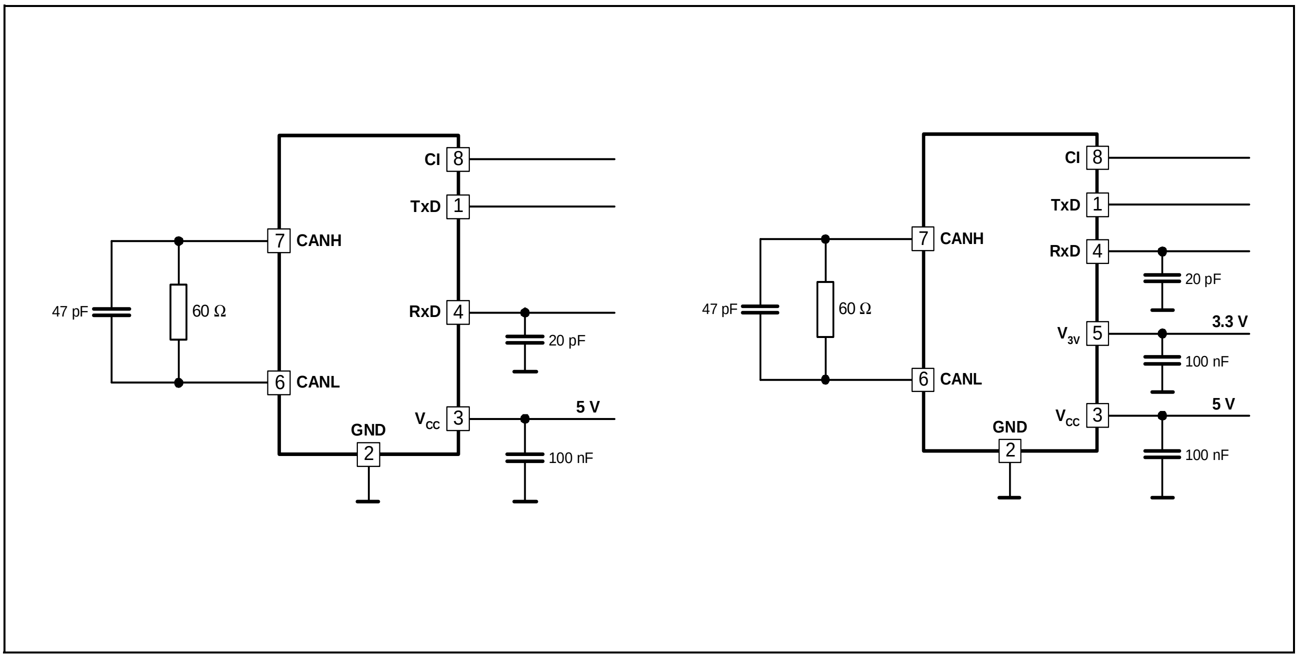


Figure 3: Test circuits

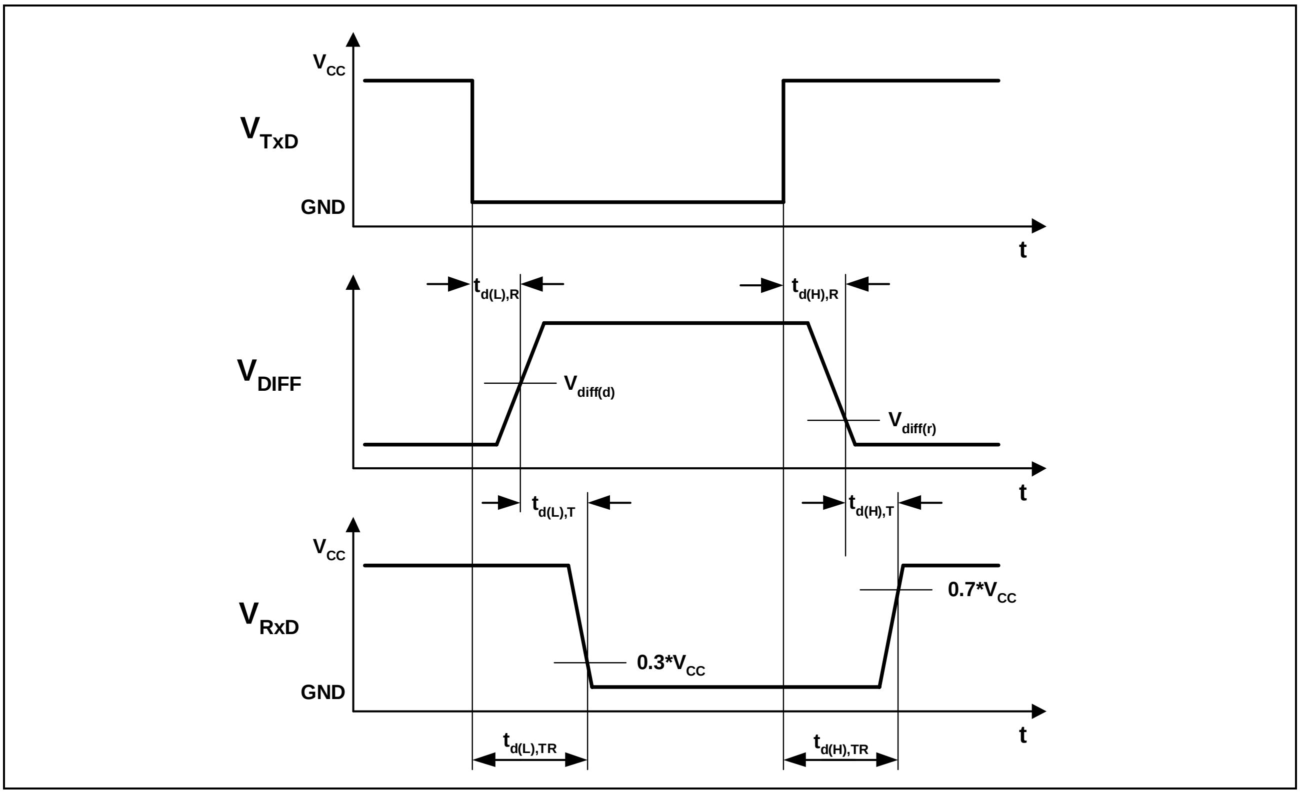


Figure 4: Timing diagrams for dynamic characteristics

4 Application

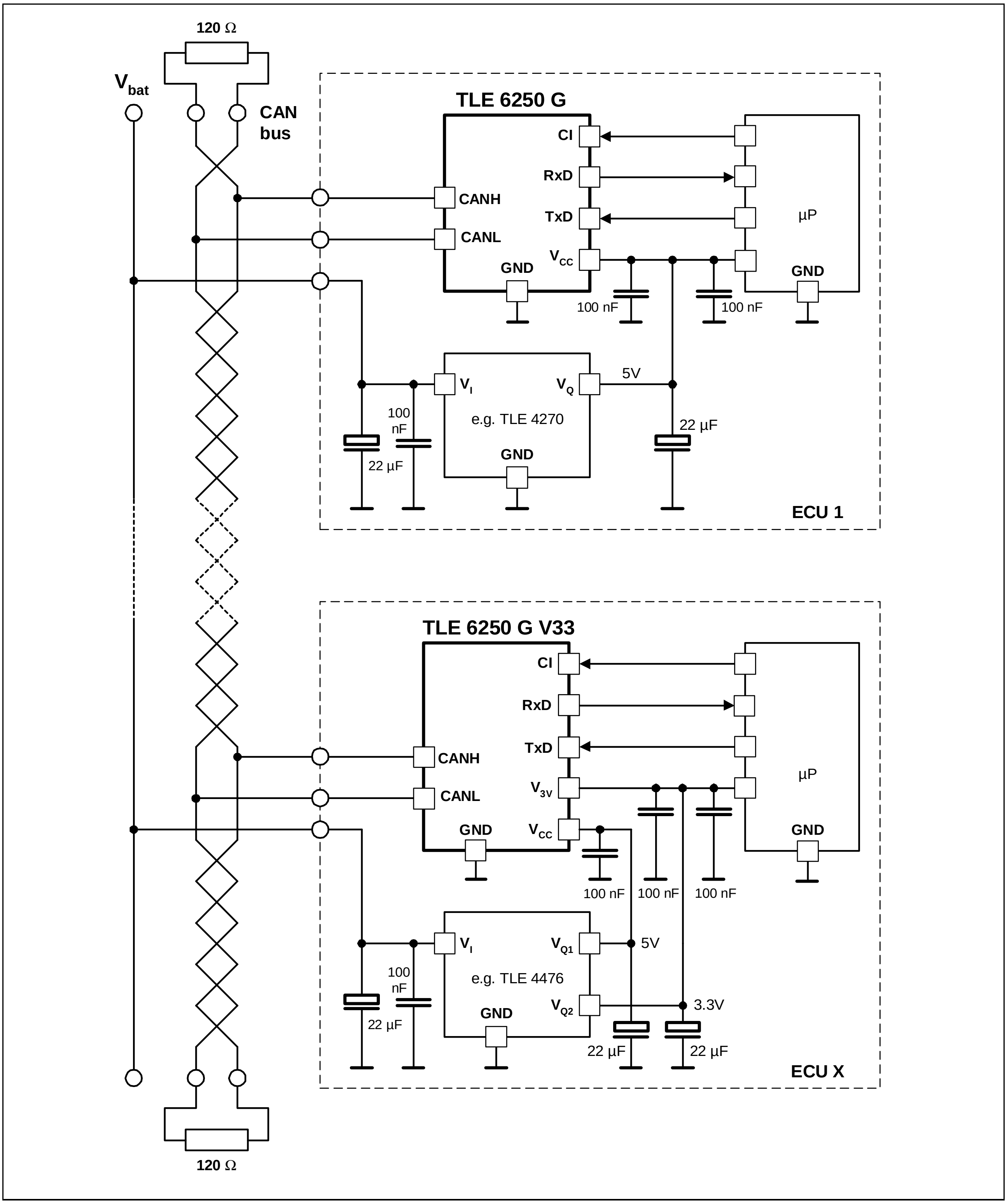
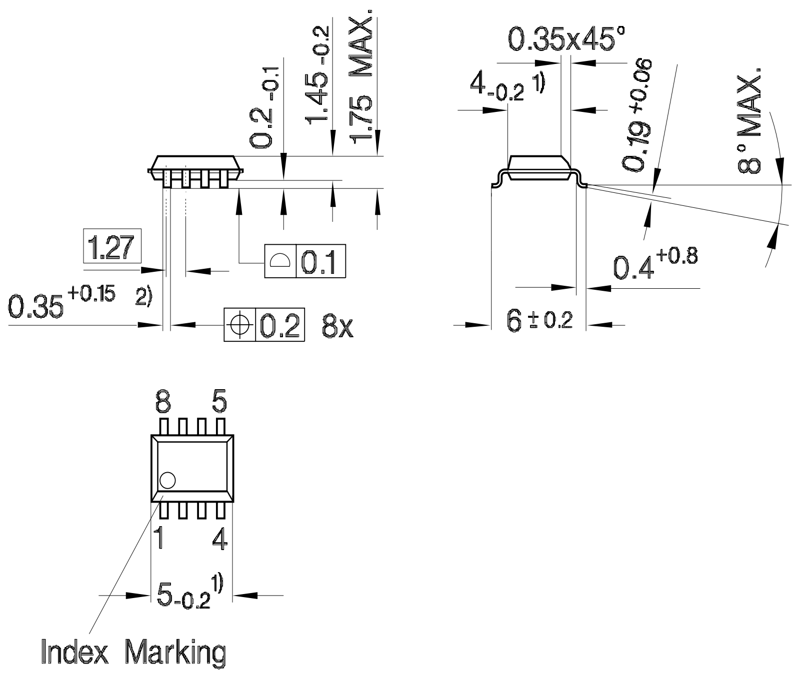


Figure 5
Application Circuit

5 Package Outlines

P-DSO-8-3
(Plastic Dual Small Outline Package)



1) Does not include plastic or metal protrusion of 0.15 max. per side
2) Lead width can be 0.61 max. in dambar area

Sorts of Packing
Package outlines for tubes, trays etc. are contained in our Data Book “Package Information”.

SMD = Surface Mounted Device

Dimensions in mm