SIEMENS

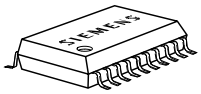
1-A Dual-HBD (**Dual**-**H**alf-**B**ridge **D**river) TLE 4207

Overview

Features

- Delivers up to 0.8 A continuous
- Optimized for DC motor management applications
- Very low current consumption in stand-by (Inhibit) mode
- Low saturation voltage; typ.1.2 V total @ 25 °C; 0.4 A
- Output protected against short circuit
- Error flag diagnosis
- Overvoltage lockout and diagnosis
- Undervoltage lockout
- CMOS/TTL compatible inputs with hysteresis
- No crossover current
- Internal clamp diodes
- Overtemperature protection with hysteresis and diagnosis
- Enhanced power P-DSO-Package

P-DSO-14-4



P-DSO-20-6

Type	Ordering Code	Package
TLE 4207 G	Q67006-A9275	P-DSO-14-4
TLE 4207 GL	on request	P-DSO-20-6

Description

The TLE 4207 is a fully protected **Dual**-**H**alf-**B**ridge-**D**river designed specially for automotive and industrial motion control applications.

The part is built using the Siemens bipolar high voltage power technology DOPL.

The actuator (DC motor) can be connected direct between the halfbridges. Operation modes forward (cw), reverse (ccw), brake and high impedance are invoked from a standard interface. The standard enhanced power P-DSO-14 package meets the application requirements and saves PCB-board space and costs.

Furthermore the built in features like diagnosis, over- and undervoltage-lockout, short-circuit-protection, over-temperature-protection and the very low quiescent current in stand-by mode will open a wide range of automotive and industrial applications.

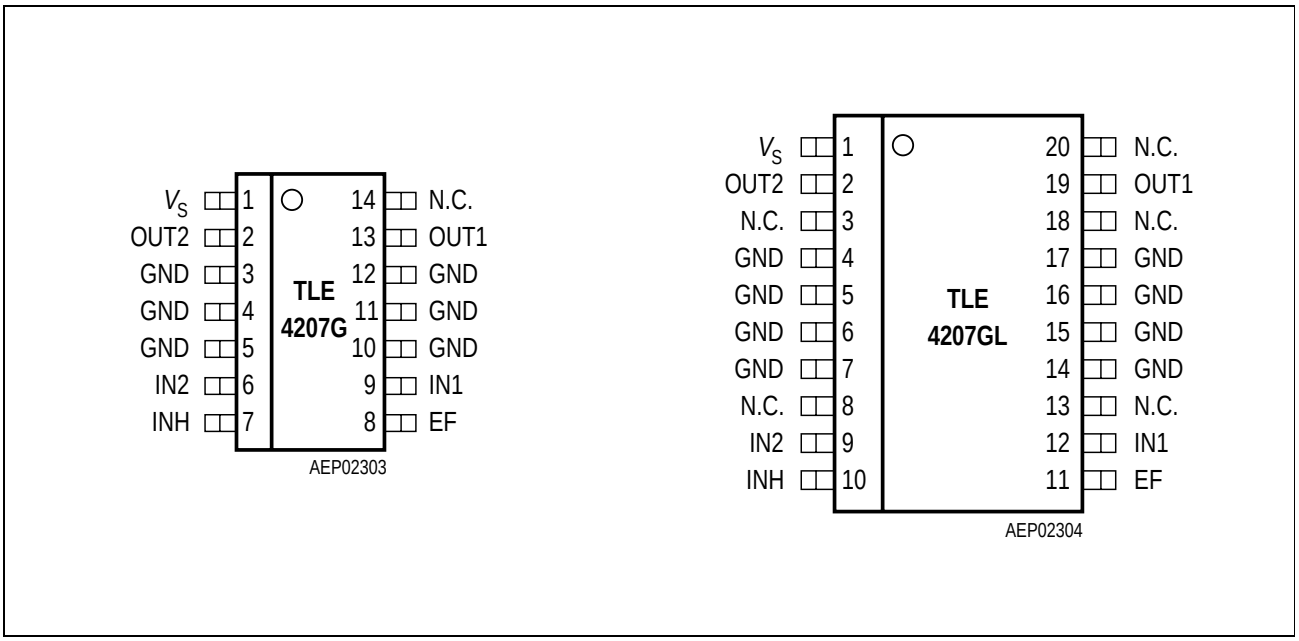


Figure 1 Pin Configuration (top view)

Pin Definitions and Functions

Pin No. P-DSO-14-4	Pin No. P-DSO-20-6	Symbol	Function
1	1	V_S	**Power supply voltage;** positive reference potential for blocking capacitor
2	2	OUT2	**Power-output 2;** full short circuit protected; with integrated clamp diodes
3, 4, 5, 10, 11, 12	4, 5, 6, 7, 14, 15, 16, 17	GND	**Ground;** **negative** reference potential for blocking capacitor
6	9	IN2	**Input channel 2;** controls OUT2 (not inverted)
7	10	INH	**Inhibit input;** low = IC in stand-by
8	11	EF	**Error Flag output;** open collector; low = error
9	12	IN1	**Input channel 1;** controls OUT1 (not inverted)
13	19	OUT1	**Power output 1;** full short circuit protected; with integrated clamp diodes
14	3, 8, 13, 18, 20	N.C.	**Not connected**

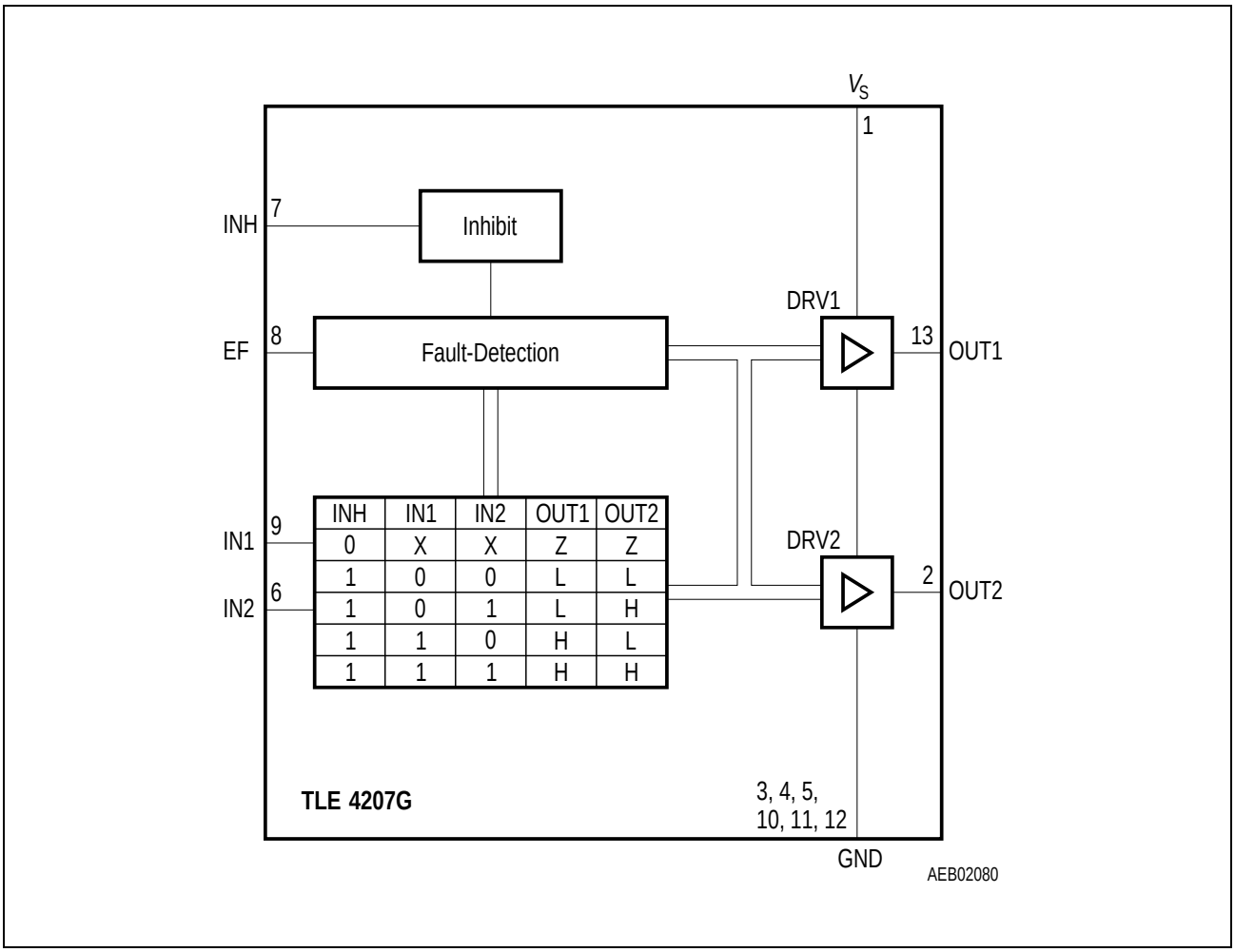


Figure 2 Block Diagram

Functional Truth Table

INH	IN1	IN2	OUT1	OUT2	Mode
0	X	X	Z	Z	Stand-By
1	0	0	L	L	Brake LL
1	0	1	L	H	CW
1	1	0	H	L	CCW
1	1	1	H	H	Brake HH

IN: 0 = Logic LOW
1 = Logic HIGH
X = don’t care

OUT: Z = Output in tristate condition
L = Output in sink condition
H = Output in source condition

Diagnosis

EF	Error
1	no error
0	over temperature
0	over voltage

Electrical Characteristics

Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Voltages					
Supply voltage	V_S	– 0.3	45	V	–
Supply voltage	V_S	– 1	–	V	t < 0.5 s; I_S > – 2 A
Logic input voltages (IN1; IN2; INH)	V_I	– 5	20	V	0 V < V_S < 45 V
Logic output voltage (EF)	V_{EF}	– 0.3	20	V	0 V < V_S < 45 V
Currents					
Output current (cont.)	I_{OUT1-2}	–	–	A	internally limited
Output current (peak)	I_{OUT1-2}	–	–	A	internally limited
Output current (diode)	I_{OUT1-2}	– 1	1	A	–
Output current (EF)	I_{OUT1-2}	– 2	5	mA	–
Temperatures					
Junction temperature	T_j	– 40	150	°C	–
Storage temperature	T_{stg}	– 50	150	°C	–
Thermal Resistances					
Junction pin	$R_{thj-pin}$	–	25	K/W	measured to pin 5
Junction ambient	R_{thjA}	–	65	K/W	–

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

Operating Range

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Supply voltage	V_S	$V_{UV\ OFF}$	18	V	After V_S rising above $V_{UV\ ON}$
Supply voltage increasing	V_S	– 0.3	$V_{UV\ ON}$	V	Outputs in tristate
Supply voltage decreasing	V_S	– 0.3	$V_{UV\ OFF}$	V	Outputs in tristate
Logic input voltage (IN1; IN2; INH)	V_I	– 2	18	V	–
Junction temperature	T_j	– 40	150	°C	–

Note: In the operating range the functions given in the circuit description are fulfilled.

Electrical Characteristics

8 V < V_S < 18 V; INH = High; I_{OUT1-2} = 0 A; – 40 °C < T_j < 150 °C;
unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Current Consumption						
Quiescent current	I_S	–	20	50	µA	INH = LOW
Quiescent current	I_S	–	20	30	µA	INH = LOW; V_S = 13.2 V; T_j = 25 °C
Supply current	I_S	–	10	20	mA	–
Supply current	I_S	–	–	30	mA	I_{OUT1} = 0.4 A I_{OUT2} = – 0.4 A
Supply current	I_S	–	–	50	mA	I_{OUT1} = 0.8 A I_{OUT2} = – 0.8 A
Over- and Under Voltage Lockout						
UV Switch ON voltage	$V_{UV\ ON}$	–	6.5	7.5	V	V_S increasing
UV Switch OFF voltage	$V_{UV\ OFF}$	5.0	6	–	V	V_S decreasing
UV ON/OFF hysteresis	$V_{UV\ HY}$	–	0.5	–	V	$V_{UV\ ON} - V_{UV\ OFF}$
OV Switch OFF voltage	$V_{OV\ OFF}$	–	20	24	V	V_S increasing
OV Switch ON voltage	$V_{OV\ ON}$	18.0	19.5	–	V	V_S decreasing
OV ON/OFF hysteresis	$V_{OV\ HY}$	–	0.5	–	V	$V_{OV\ OFF} - V_{OV\ ON}$

Electrical Characteristics (cont'd)

8 V < V_S < 18 V; INH = High; I_{OUT1-2} = 0 A; – 40 °C < T_j < 150 °C;
unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Outputs OUT1-2						
Saturation Voltages						
Source (upper) I_{OUT} = – 0.2 A	$V_{SAT\,U}$	–	0.85	1.15	V	T_j = 25 °C
Source (upper) I_{OUT} = – 0.4 A	$V_{SAT\,U}$	–	0.90	1.20	V	T_j = 25 °C
Sink (upper) I_{OUT} = – 0.8 A	$V_{SAT\,U}$	–	1.10	1.50	V	T_j = 25 °C
Sink (lower) I_{OUT} = 0.2 A	$V_{SAT\,L}$	–	0.15	0.23	V	T_j = 25 °C
Sink (lower) I_{OUT} = 0.4 A	$V_{SAT\,L}$	–	0.25	0.40	V	T_j = 25 °C
Sink (lower) I_{OUT} = 0.8 A	$V_{SAT\,L}$	–	0.45	0.75	V	T_j = 25 °C
Total Drop I_{OUT} = 0.2 A	V_{SAT}	–	1	1.4	V	$V_{SAT} = V_{SAT\,U} + V_{SAT\,L}$
Total Drop I_{OUT} = 0.4 A	V_{SAT}	–	1.2	1.7	V	$V_{SAT} = V_{SAT\,U} + V_{SAT\,L}$
Total Drop I_{OUT} = 0.8 A	V_{SAT}	–	1.6	2.5	V	$V_{SAT} = V_{SAT\,U} + V_{SAT\,L}$
Clamp Diodes						
Forward voltage; upper	V_{FU}	–	1	1.5	V	I_F = 0.4 A
Upper leakage current	I_{LKU}	–	–	5	mA	I_F = 0.4 A[1)]
Forward voltage; lower	V_{FL}	–	0.9	1.4	V	I_F = 0.4 A

Notes see page 10.

Electrical Characteristics (cont'd)

8 V < V_S < 18 V; INH = High; I_{OUT1-2} = 0 A; – 40 °C < T_j < 150 °C;
unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Input-Interface						
Logic Inputs IN1; IN2						
H-input voltage	V_{IH}	–	2	3	V	–
L-input voltage	V_{IL}	1	1.5	–	V	–
Hysteresis of input voltage	V_{IHY}	–	0.5	–	V	–
H-input current	I_{IH}	– 2	–	10	µA	V_I = 5 V
L-input current	I_{IL}	– 100	– 20	– 5	µA	V_I = 0 V
Logic Input INH						
H-input voltage	V_{IH}	–	2.7	3.5	V	–
L-input voltage	V_{IL}	1	2	–	V	–
Hysteresis of input voltage	V_{IHY}	–	0.7	–	V	–
H-input current	I_{IH}	–	100	250	µA	V_{INH} = 5 V
L-input current	I_{IL}	– 10	–	10	µA	V_{INH} = 0 V
Error-Flag EF						
L-output voltage level	V_{EFL}	–	0.2	0.4	V	I_{EF} = 2 mA
Leakage current	I_{EFLK}	–	–	10	µA	0 V < V_{EF} < 7 V

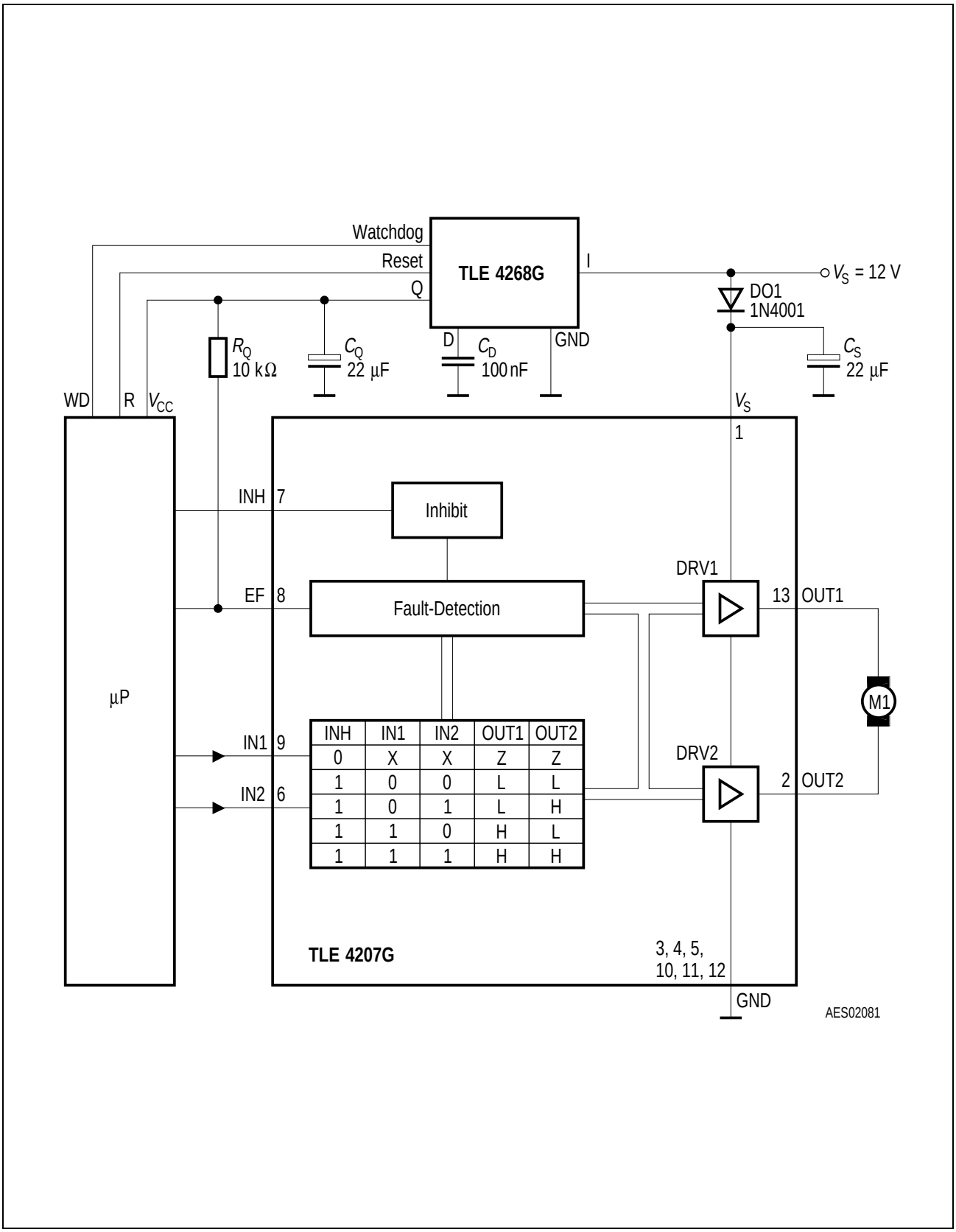
Electrical Characteristics (cont'd)

8 V < V_S < 18 V; INH = High; I_{OUT1-2} = 0 A; – 40 °C < T_j < 150 °C;
unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Thermal Shutdown						
Thermal shutdown junction temperature	T_{jSD}	150	175	200	°C	–
Thermal switch-on junction temperature	T_{jSO}	120	–	170	°C	–
Temperature hysteresis	ΔT	–	30	–	K	–

1) Guaranteed by design.

Note: The listed characteristics are ensured over the operating range of the integrated circuit. Typical characteristics specify mean values expected over the production spread. If not otherwise specified, typical characteristics apply at T_A = 25 °C and the given supply voltage.

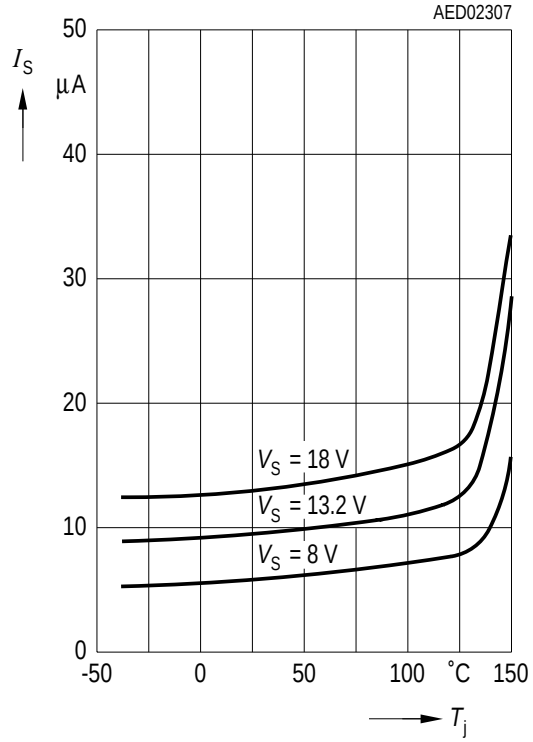


INH	IN1	IN2	OUT1	OUT2
0	X	X	Z	Z
1	0	0	L	L
1	0	1	L	H
1	1	0	H	L
1	1	1	H	H

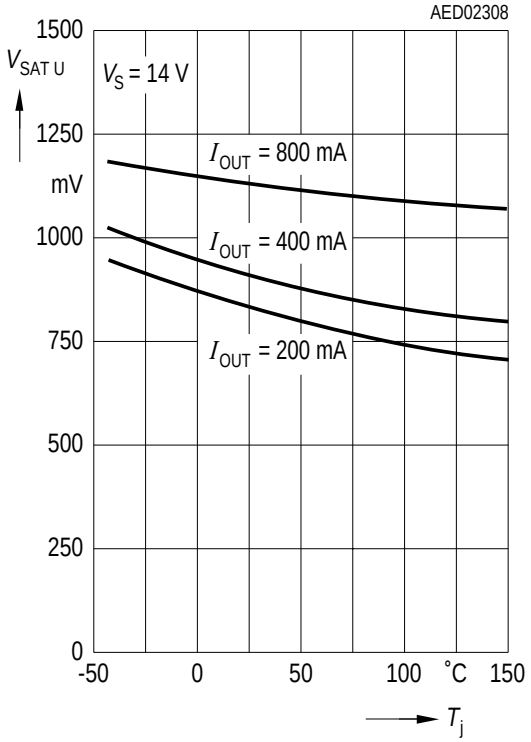
Figure 3 Application Circuit

Diagrams

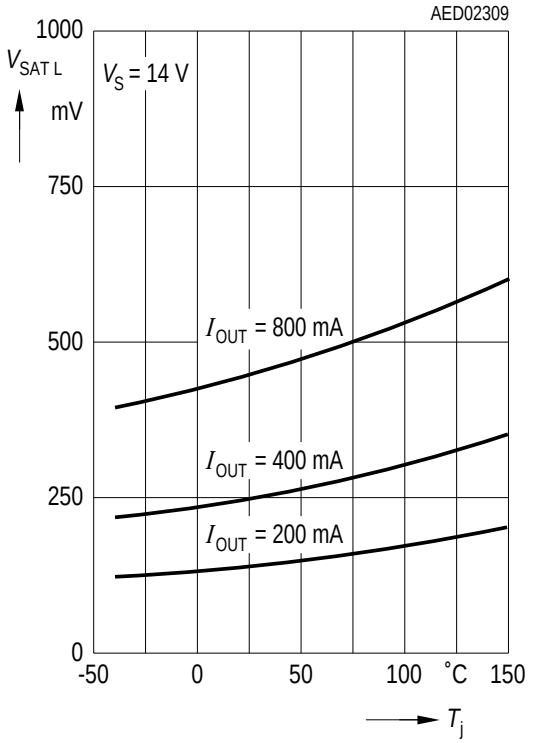
Quiescent current I_S over Temperature



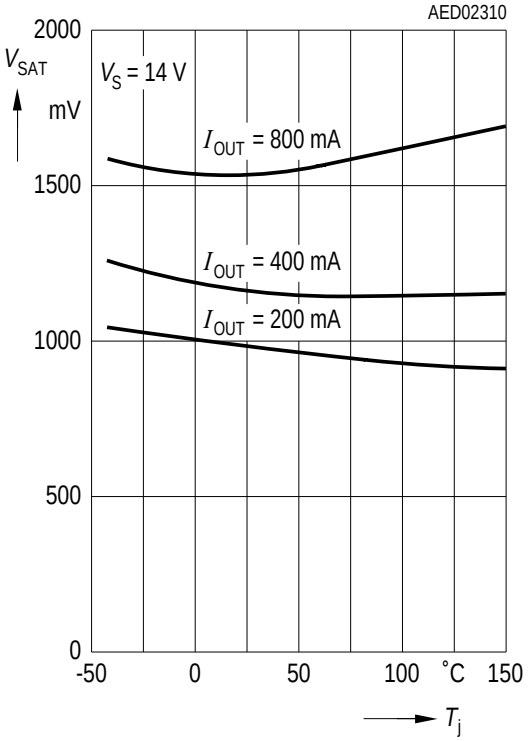
Saturation Voltage of Source $V_{SAT\,U}$ over Temperature



Saturation Voltage of Sink $V_{SAT\,L}$ over Temperature

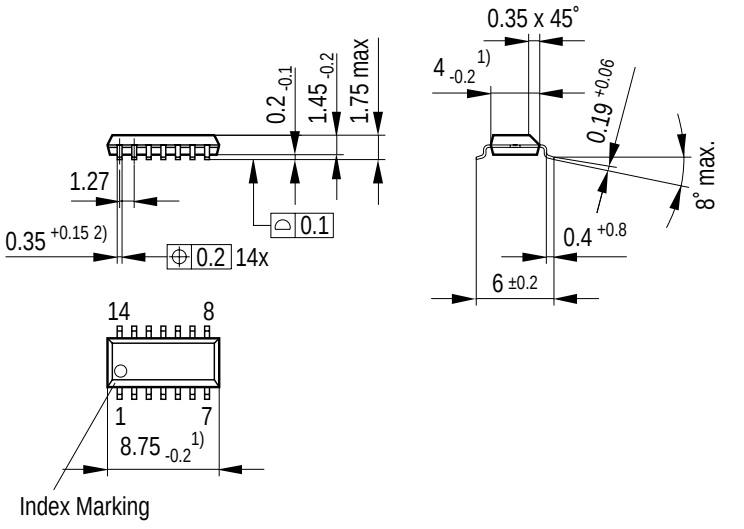


Total Drop at outputs V_{SAT} over Temperature



Package Outlines

P-DSO-14-4
(Plastic Dual Small Outline Package)



1) Does not include plastic or metal protrusion of 0.15 max. per side

2) Does not include dambar protrusion of 0.05 max. per side

GPS05093

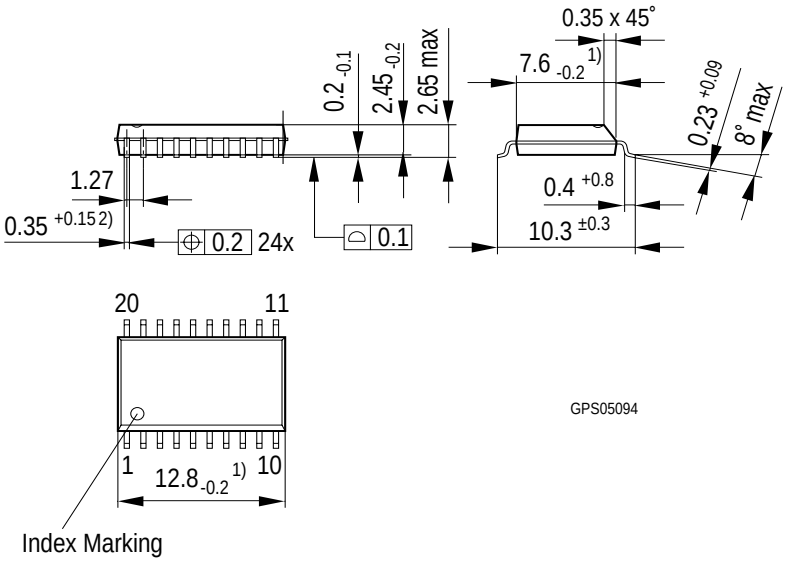
Sorts of Packing

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

SMD = Surface Mounted Device

Dimensions in mm

P-DSO-20-6
(Plastic Dual Small Outline Package)



1) Does not include plastic or metal protrusions of 0.15 max per side
2) Does not include dambar protrusion of 0.05 max per side

Sorts of Packing
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Dimensions in mm