

1-A DC Motor Driver for Servo Driver Applications

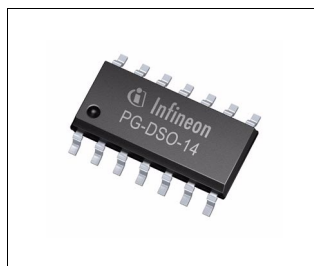
TLE 4206-2G



Overview

Features

- Optimized for headlight beam control applications
- Delivers up to 0.8 A continuous
- Low saturation voltage; typ. 1.2 V total @ 25 °C; 0.4 A
- Output protected against short circuit
- Overtemperature protection with hysteresis
- Over- and undervoltage lockout
- No crossover current
- Internal clamp diodes
- Enhanced power packages
- Range low-voltage detection with hysteresis
- Green Product (RoHS compliant)
- AEC Qualified



PG-DSO-14-22

Type	Ordering Code	Package
TLE 4206-2G	on request	PG-DSO-14-22

Description

The TLE 4206-2G is a protected H-Bridge Driver designed specifically for automotive headlight beam control and industrial servo control applications. The part is built using Infineons bipolar high voltage power technology DOPL.

The standard enhanced power PG-DSO-14-22 package meets the application requirements and saves PCB-board space and costs. Moreover the package is RoHS compliant.

The servo-loop-parameter pos.- and neg. Hysteresis, pos.- and neg. deadband and angle-amplification are programmable with external resistors. An internal window-comparator controls the input line. In the case of a fault condition, like short circuit to GND, short circuit to supply-voltage, and broken wire, the TLE 4206-2G stops the motor immediately (brake condition).

Furthermore the built in features like over- and undervoltage-lockout, short-circuit-protection and over-temperature-protection will open a wide range of automotive- and industrial applications.

The TLE 4206-2G is a design-version of the TLE 4206. In the TLE 4206-2G, the current peak blanking Pin is disconnected. A hysteresis is introduced at the lower RANGE threshold. This allows reliable de-activation of the device by pulling the RANGE input to GND also under critical application conditions.

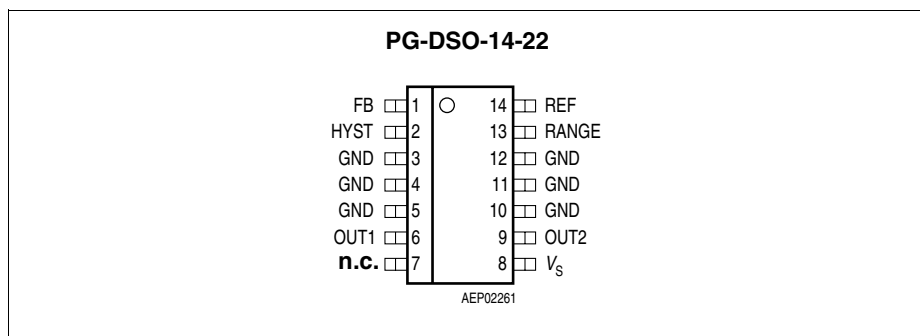


Figure 1 Pin Configuration (top view)

Pin Definitions and Functions

Pin No. PG-DSO-14-23	Symbol	Function
1	FB	Feedback Input
2	HYST	Hysteresis I/O
3, 4, 5, 10, 11, 12	GND	Ground
6	OUT1	Power Output 1
7	n.c.	Not connected
8	V_s	Power Supply Voltage
9	OUT2	Power Output 2
13	RANGE	Range Input
14	REF	Reference Input
—	n.c.	Not connected

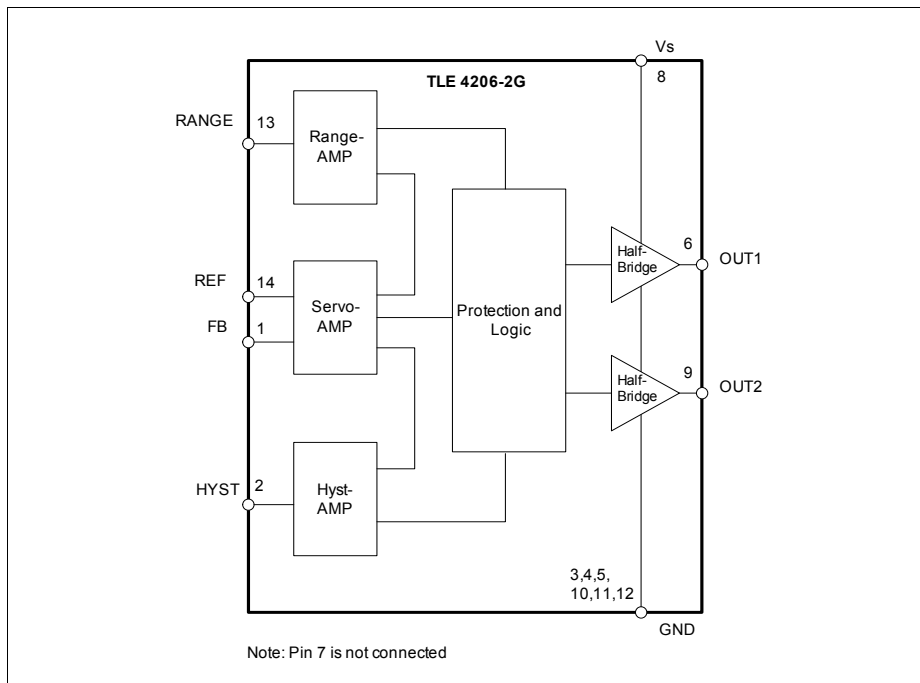


Figure 2 Block Diagram

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	$t < 0.5 \text{ s}; I_S > - 2 \text{ A}$
Logic input voltages (FB, REF, RANGE, HYST, CPB)	V_I	- 0.3	20	V	–

Currents

Output current (OUT1, OUT2)	I_{OUT}	–	–	A	internally limited
Output current (Diode)	I_{OUT}	- 1	1	A	–
Input current (FB, REF, RANGE, HYST)	I_{IN}	- 2 - 6	2 6	mA mA	$t < 2 \text{ ms}; t/T < 0.1$

Temperatures

Junction temperature	T_j	- 40	150	°C	–
Storage temperature	T_{stg}	- 50	150	°C	–

Thermal Resistances

Junction pin (PG-DSO-14-22)	$R_{thj-pin}$	–	25	K/W	measured to pin 5
Junction ambient (PG-DSO-14-22)	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	8	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
Output current	I_{OUT1-2}	− 0.8	0.8	A	–
Input current (FB, REF)	I_{IN}	− 50	500	μA	–
Junction temperature	T_j	− 40	150	°C	–

Electrical Characteristics

$8\text{ V} < V_S < 18\text{ V}$; $I_{\text{OUT}1-2} = 0\text{ A}$; $-40\text{ }^{\circ}\text{C} < T_j < 150\text{ }^{\circ}\text{C}$
(unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		

Current Consumption

Supply current	I_S	–	12	20	mA	–
Supply current	I_S	–	20	30	mA	$I_{\text{OUT}1} = 0.4\text{ A}$ $I_{\text{OUT}2} = -0.4\text{ A}$
Supply current	I_S	–	30	50	mA	$I_{\text{OUT}1} = 0.8\text{ A}$ $I_{\text{OUT}2} = -0.8\text{ A}$

Over- and Under Voltage Lockout

UV Switch ON voltage	$V_{\text{UV ON}}$	–	7.4	8	V	V_S increasing
UV Switch OFF voltage	$V_{\text{UV OFF}}$	6.3	6.9	–	V	V_S decreasing
UV ON/OFF Hysteresis	V_{UVHY}	–	0.5	–	V	$V_{\text{UV ON}} - V_{\text{UV OFF}}$
OV Switch OFF voltage	$V_{\text{OV OFF}}$	–	20.5	23	V	V_S increasing
OV Switch ON voltage	$V_{\text{OV ON}}$	17.5	20	–	V	V_S decreasing
OV ON/OFF Hysteresis	V_{OVHY}	–	0.5	–	V	$V_{\text{OV OFF}} - V_{\text{OV ON}}$

Electrical Characteristics (cont'd)

 $8\text{ V} < V_S < 18\text{ V}; I_{\text{OUT}1-2} = 0\text{ A}; -40\text{ }^{\circ}\text{C} < T_j < 150\text{ }^{\circ}\text{C}$

(unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		

Outputs OUT1-2
Saturation Voltages

Source (upper) $I_{\text{OUT}} = -0.2\text{ A}$	$V_{\text{SAT U}}$	–	0.85	1.15	V	$T_j = 25\text{ }^{\circ}\text{C}$
Source (upper) $I_{\text{OUT}} = -0.4\text{ A}$	$V_{\text{SAT U}}$	–	0.90	1.20	V	$T_j = 25\text{ }^{\circ}\text{C}$
Sink (upper) $I_{\text{OUT}} = -0.8\text{ A}$	$V_{\text{SAT U}}$	–	1.10	1.50	V	$T_j = 25\text{ }^{\circ}\text{C}$
Sink (lower) $I_{\text{OUT}} = 0.2\text{ A}$	$V_{\text{SAT L}}$	–	0.15	0.23	V	$T_j = 25\text{ }^{\circ}\text{C}$
Sink (lower) $I_{\text{OUT}} = 0.4\text{ A}$	$V_{\text{SAT L}}$	–	0.25	0.40	V	$T_j = 25\text{ }^{\circ}\text{C}$
Sink (lower) $I_{\text{OUT}} = 0.8\text{ A}$	$V_{\text{SAT L}}$	–	0.45	0.75	V	$T_j = 25\text{ }^{\circ}\text{C}$

Total drop $I_{\text{OUT}} = 0.2\text{ A}$	V_{SAT}	–	1.0	1.4	V	$V_{\text{SAT}} = V_{\text{SAT U}} + V_{\text{SAT L}}$
Total drop $I_{\text{OUT}} = 0.4\text{ A}$	V_{SAT}	–	1.2	1.7	V	$V_{\text{SAT}} = V_{\text{SAT U}} + V_{\text{SAT L}}$
Total drop $I_{\text{OUT}} = 0.8\text{ A}$	V_{SAT}	–	1.6	2.5	V	$V_{\text{SAT}} = V_{\text{SAT U}} + V_{\text{SAT L}}$

Clamp Diodes

Forward voltage; upper	V_{FU}	–	1	1.5	V	$I_F = 0.4\text{ A}$
Upper leakage current	I_{LKU}	–	–	5	mA	$I_F = 0.4\text{ A}$
Forward voltage; lower	V_{FL}	–	0.9	1.4	V	$I_F = 0.4\text{ A}$

Electrical Characteristics (cont'd)

8 V < V_S < 18 V; $I_{OUT1-2} = 0$ A; $-40\text{ }^{\circ}\text{C} < T_j < 150\text{ }^{\circ}\text{C}$
(unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		

Input-Interface
Input REF

Quiescent voltage	V_{REFq}	–	200	–	mV	$I_{REF} = 0\text{ }\mu\text{A}$
Input resistance	R_{REF}	–	6	–	k Ω	$0\text{ V} < V_{REF} < 0.5\text{ V}$

Input FB

Quiescent voltage	V_{FBq}	–	200	–	mV	$I_{FB} = 0\text{ }\mu\text{A}$
Input resistance	R_{FB}	–	6	–	k Ω	$0\text{ V} < V_{FB} < 0.5\text{ V}$

Input/Output HYST

Current Amplification $A_{HYST} = I_{HYST} / (I_{REF} - I_{FB})$	A_{HYST}	0.8	0.95	1.1	–	$-20\text{ }\mu\text{A} < I_{HYST} < -10\text{ }\mu\text{A};$ $10\text{ }\mu\text{A} < I_{HYST} < 20\text{ }\mu\text{A};$ $I_{REF} = 250\text{ }\mu\text{A}$ $V_{HYST} = V_S / 2$
Current Offset	I_{HYSTIO}	– 2	0.35	3	μA	$I_{REF} = I_{FB} = 250\text{ }\mu\text{A}$ $V_{HYST} = V_S / 2$
Threshold voltage High	V_{HYH} / V_S	–	52	–	%	–
Deadband voltage High	V_{DBH} / V_S	–	50.4	–	%	–
Deadband voltage Low	V_{DBL} / V_S	–	49.6	–	%	–
Threshold voltage Low	V_{HYL} / V_S	–	48	–	%	–
Hysteresis Window	V_{HYW} / V_S	3	4	5	%	$(V_{HYH} - V_{HYL}) / V_S$
Deadband Window	V_{DBW} / V_S	0.4	0.8	1.2	%	$(V_{DBH} - V_{DBL}) / V_S$

Electrical Characteristics (cont'd)

 $8\text{ V} < V_S < 18\text{ V}; I_{\text{OUT}1-2} = 0\text{ A}; -40\text{ }^{\circ}\text{C} < T_j < 150\text{ }^{\circ}\text{C}$

(unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		

Input RANGE

Input current	I_{RANGE}	- 1	-	1	μA	$0\text{ V} < V_{\text{RANGE}} < V_S$
Switch-OFF voltage High	V_{OFFH}	- 25	0	100	mV	refer to V_S
Switch-OFF voltage Low	V_{OFFL}	310	390	490	mV	refer to GND, V_{RANGE} decreasing
Switch-ON voltage Low	V_{ONL}	400	500	550	mV	refer to GND, V_{RANGE} increasing
Low-threshold hysteresis	V_{OFFLHYS}	50	110	-	mV	see Figure 6

Thermal Shutdown

Thermal shutdown junction temperature	T_{jSD}	150	175	200	$^{\circ}\text{C}$	-
Thermal switch-on junction temperature	T_{jSO}	120	-	170	$^{\circ}\text{C}$	-
Temperature hysteresis	ΔT	-	30	-	K	-

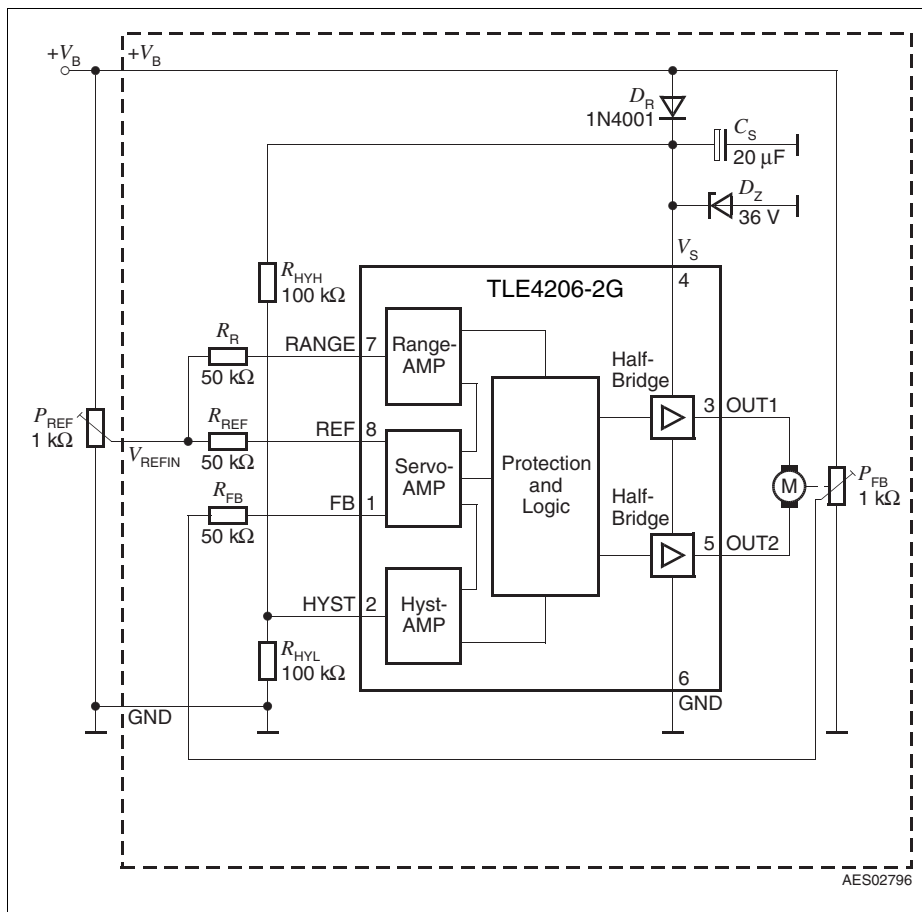


Figure 3 Application Circuit

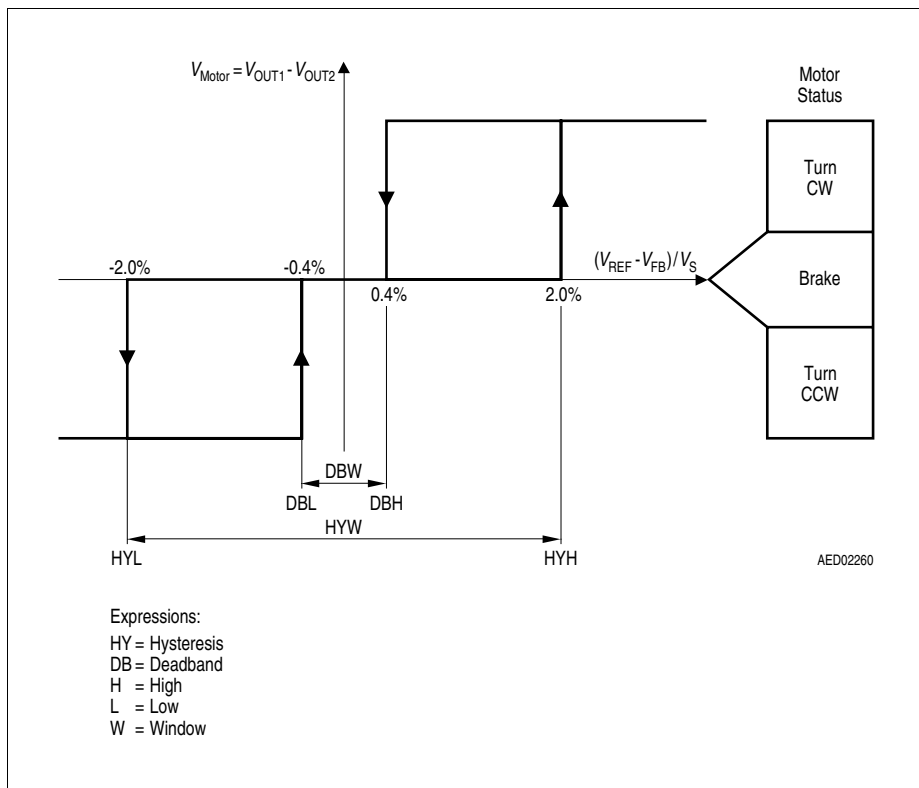


Figure 4 Hysteresis, Phaselag and Deadband-Definitions

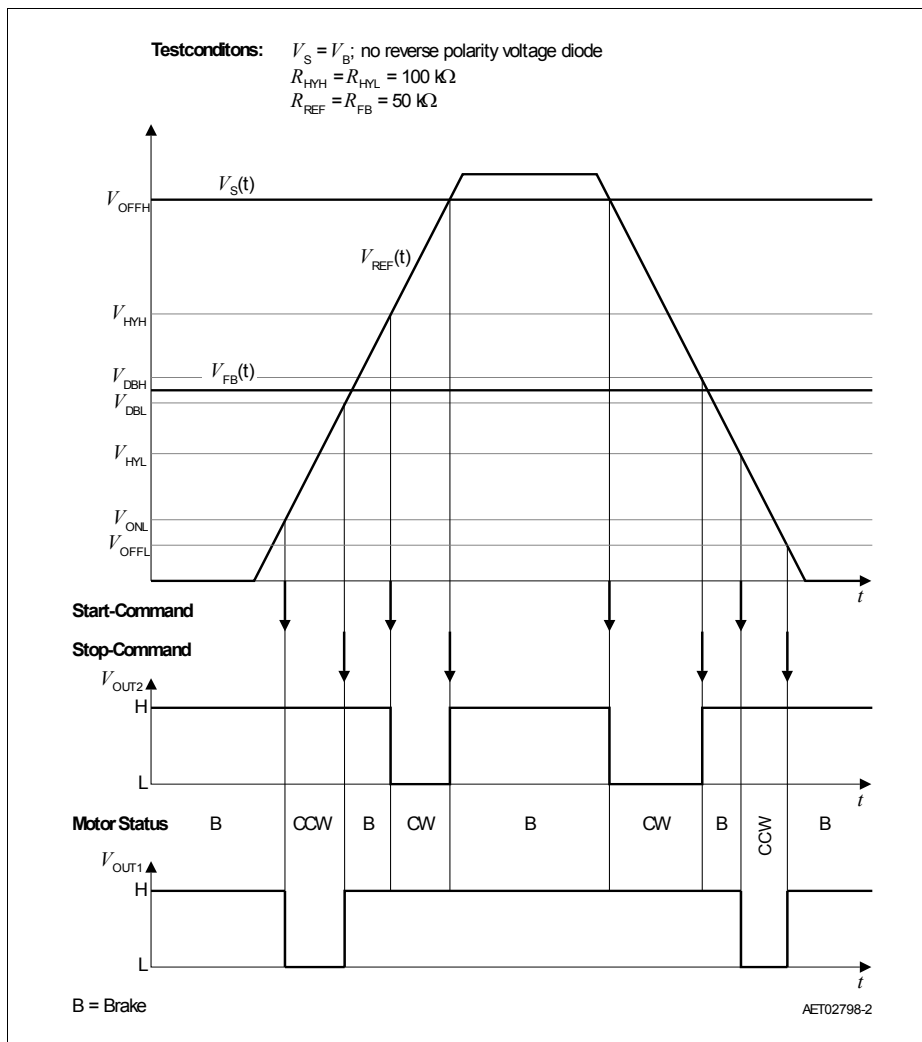


Figure 5 Timing and Phaselag

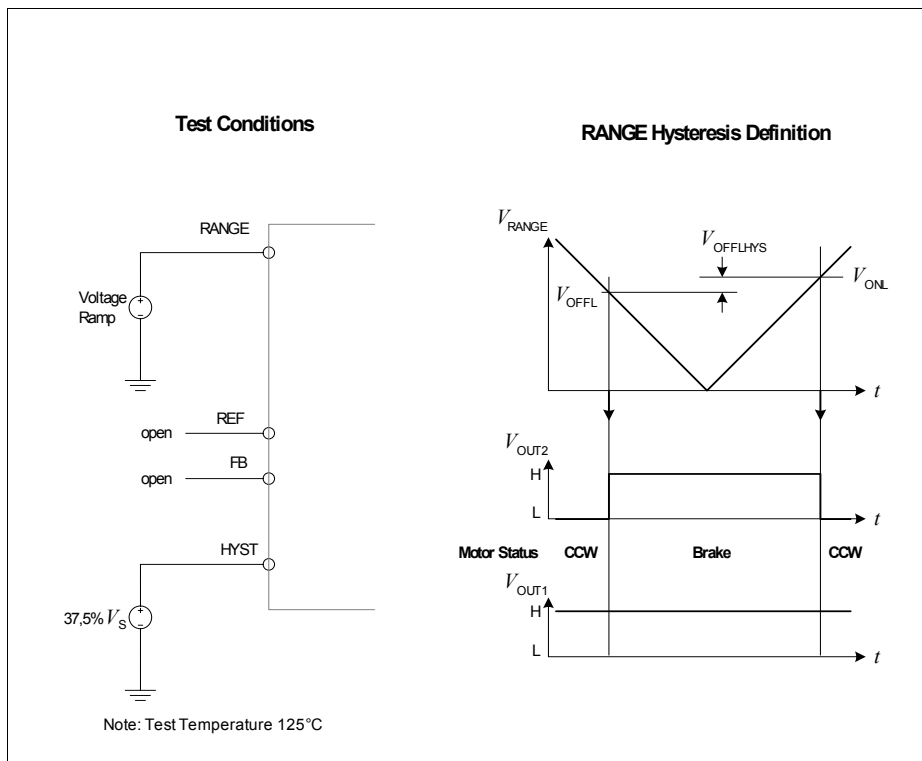
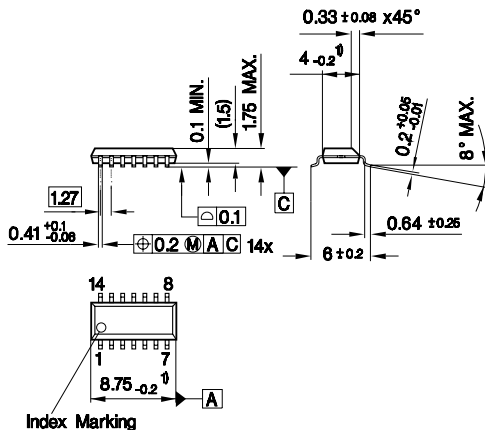


Figure 6 RANGE Hysteresis and Test Conditions

Package Outlines

PG-DSO-14-22

(Plastic Green - Dual Small Outline Package)



Green Product (RoHS compliant)

To meet the world-wide customer requirements for environmentally friendly products and to be compliant with government regulations the device is available as a green product. Green products are RoHS-Compliant (i.e Pb-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

You can find all of our packages, sorts of packing and others in our Infineon Internet Page "Products": <http://www.infineon.com/products>.

SMD = Surface Mounted Device

Dimensions in mm

Revision History

Version	Date	Changes
Rev. 1.1	2007-08-10	RoHS-compliant version of the TLE 4206-2 • All pages: Infineon logo updated • Page 1: “AEC qualified” and “RoHS” logo added, “Green Product (RoHS compliant)” and “AEC qualified” statement added to feature list, package names changed to RoHS compliant versions, package pictures updated, ordering codes removed • Page 14: - Package names changed to RoHS compliant versions, “Green Product” description added • Revision History added • Legal Disclaimer added
Rev. 1.2	2008-02-04	• Update of Figure 3 (Application Circuit) • Editorial change: deleted "fully" (The term "fully protected" often leads to misunderstandings as it is unclear with respect to which parameters); page 1 • Update Package picture; page1 • Update Figure 1; page 2

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