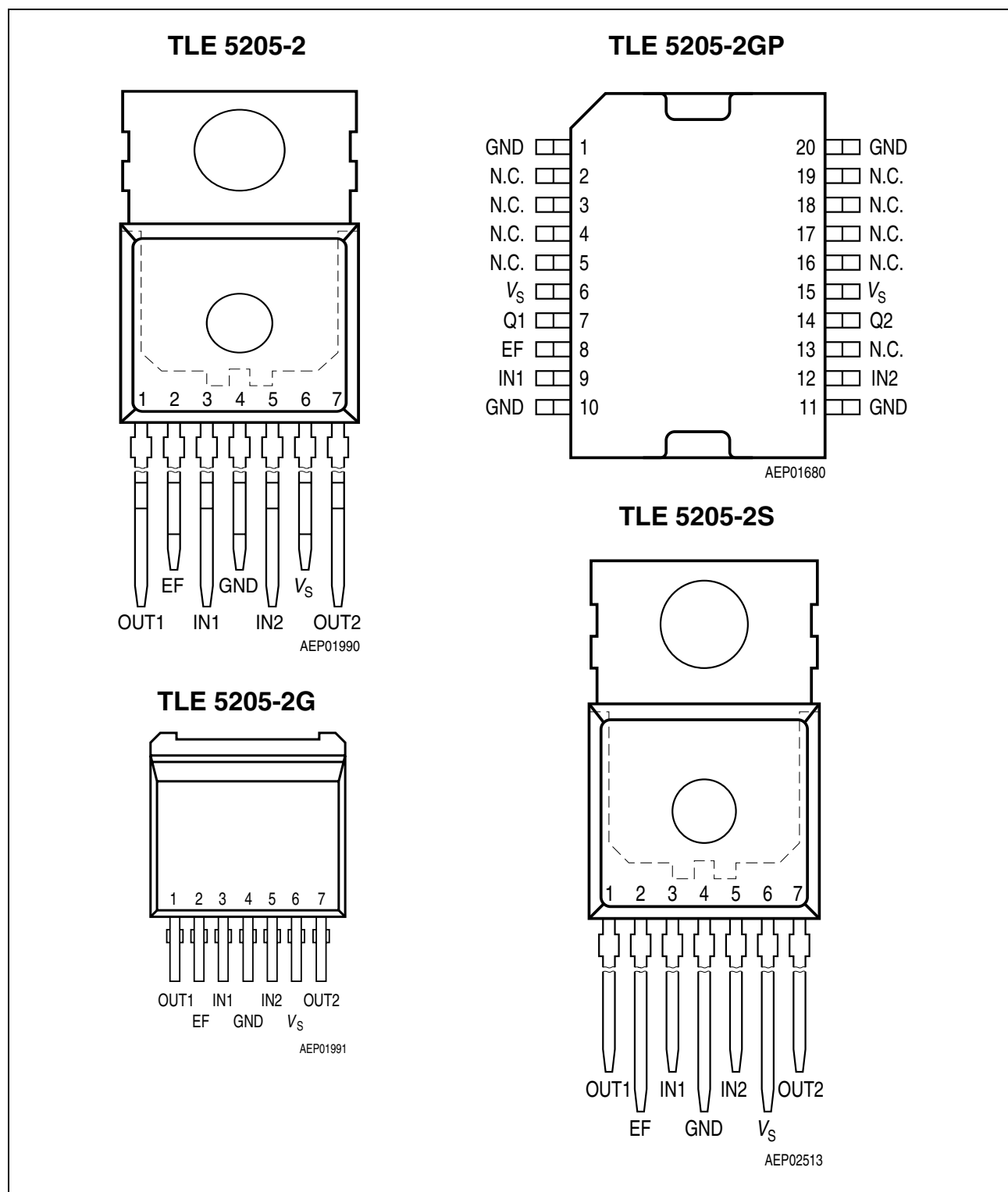


## 1.2 Pin Configuration (top view)

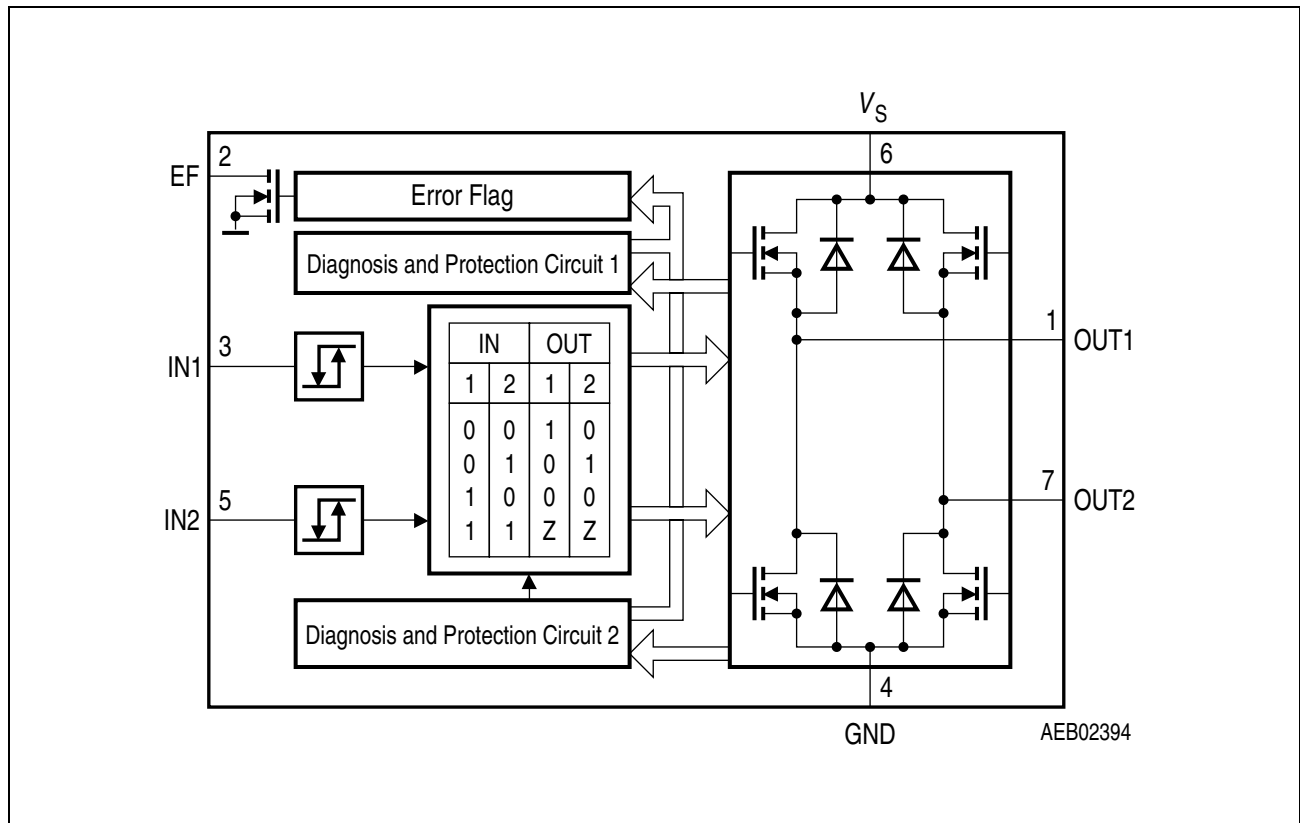


**Figure 1** Pin Assignments

### 1.3 Pin Definitions and Functions

| Pin No.<br>P-TO220 | Pin No.<br>P-DSO                 | Symbol | Function                                                                                                 |
|--------------------|----------------------------------|--------|----------------------------------------------------------------------------------------------------------|
| 1                  | 7                                | OUT1   | <b>Output of Channel 1;</b> Short-circuit protected; integrated freewheeling diodes for inductive loads. |
| 2                  | 8                                | EF     | <b>Error Flag;</b> TTL/CMOS compatible output for error detection; (open drain)                          |
| 3                  | 9                                | IN1    | <b>Control Input 1;</b> TTL/CMOS compatible                                                              |
| 4                  | 1, 10,<br>11, 20                 | GND    | <b>Ground;</b> internally connected to tab                                                               |
| 5                  | 12                               | IN2    | <b>Control Input 2;</b> TTL/CMOS compatible                                                              |
| 6                  | 6, 15                            | $V_S$  | <b>Supply Voltage;</b> block to GND                                                                      |
| 7                  | 14                               | OUT2   | <b>Output of Channel 2;</b> Short-circuit protected; integrated freewheeling diodes for inductive loads. |
| –                  | 2, 3, 4, 5,<br>16, 17, 18,<br>19 | N.C.   | <b>Not Connected</b>                                                                                     |

## 1.4 Functional Block Diagram



**Figure 2 Block Diagram**

## 1.5 Circuit Description

### Input Circuit

The control inputs consist of TTL/CMOS-compatible schmitt-triggers with hysteresis. Buffer amplifiers are driven by this stages.

### Output Stages

The output stages consist of a DMOS H-bridge. Integrated circuits protect the outputs against short-circuit to ground and to the supply voltage. Positive and negative voltage spikes, which occur when switching inductive loads, are limited by integrated freewheeling diodes.

A monitoring circuit for each output transistor detects whether the particular transistor is active and in this case prevents the corresponding source transistor (sink transistor) from conducting in sink operation (source operation). Therefore no crossover currents can occur.

## 1.6 Input Logic Truth Table

### Functional Truth Table

| IN1 | IN2 | OUT1 | OUT2 | Comments                                   |
|-----|-----|------|------|--------------------------------------------|
| L   | L   | H    | L    | Motor turns clockwise                      |
| L   | H   | L    | H    | Motor turns counterclockwise               |
| H   | L   | L    | L    | Brake; both low side transistors turned-ON |
| H   | H   | Z    | Z    | Open circuit detection                     |

### Notes for Output Stage

| Symbol | Value                                                                   |
|--------|-------------------------------------------------------------------------|
| L      | Low side transistor is turned-ON<br>High side transistor is turned-OFF  |
| H      | High side transistor is turned-ON<br>Low side transistor is turned-OFF  |
| Z      | High side transistor is turned-OFF<br>Low side transistor is turned-OFF |

## 1.7 Monitoring Functions

Undervoltage lockout (UVLO):

When  $V_S$  reaches the switch on voltage  $V_{S\text{ ON}}$  the IC becomes active with a hysteresis. All output transistors are switched off if the supply voltage  $V_S$  drops below the switch off value  $V_{S\text{ OFF}}$ .

## 1.8 Protective Function

Various errors like short-circuit to +  $V_S$ , ground or across the load are detected. All faults result in turn-OFF of the output stages after a delay of 50  $\mu\text{s}$  and setting of the error flag EF to ground. Changing the inputs resets the error flag.

### a. Output Shorted to Ground Detection

If a high side transistor is switched on and its output is shorted to ground, the output current is internally limited. After a delay of 50  $\mu\text{s}$  all outputs will be switched-OFF and the error flag is set.

### b. Output Shorted to + $V_S$ Detection

If a low side transistor is switched on and its output is shorted to the supply voltage, the output current is internally limited. After a delay of 50  $\mu\text{s}$  all outputs will be switched-OFF and the error flag is set.

### c. Overload Detection

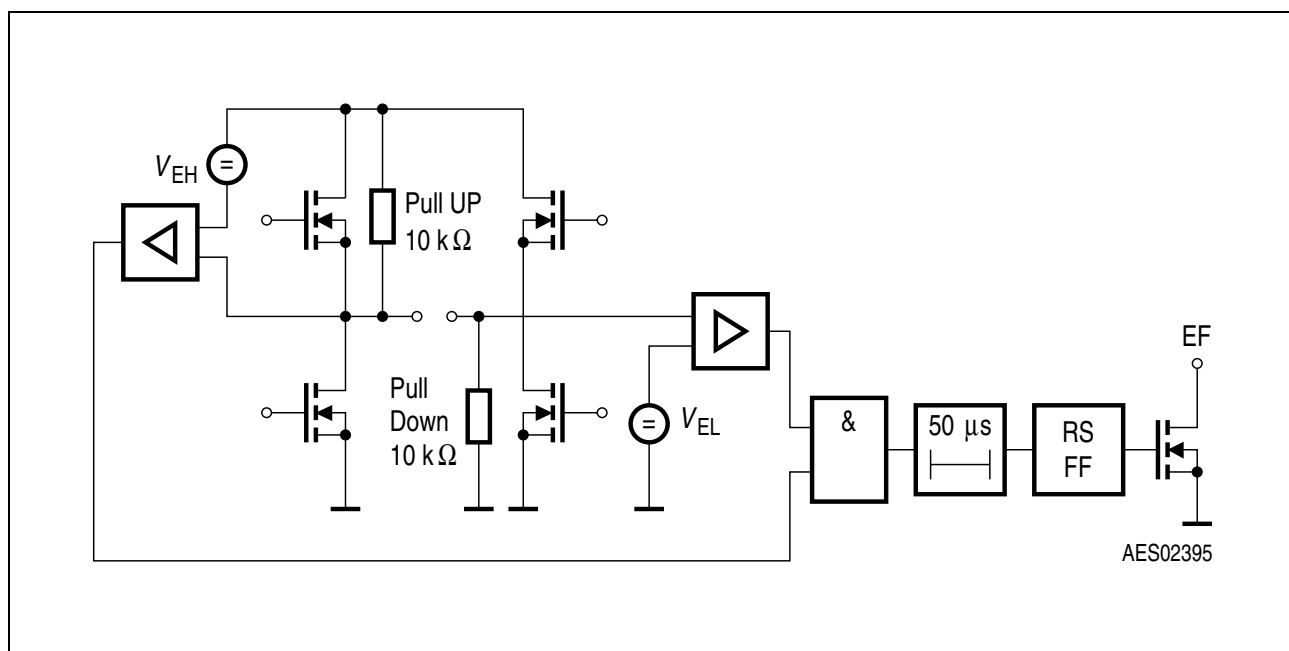
An internal circuit detects if the current through the low side transistor exceeds the trippoint  $I_{\text{SDL}}$ . In this case all outputs are turned off after 50  $\mu\text{s}$  and the error flag is set.

### d. Overtemperature Protection

At a junction temperature higher than 150 °C the thermal shutdown turns-OFF, all four output stages commonly and the error flag is set with a delay.

### e. Open Load Detection

The output Q1 has a 10 k $\Omega$  pull-up resistor and the output Q2 has a 10 k $\Omega$  pull-down resistor. If E1 and E2 are high, all output power stages are turned-OFF. In case of no load between Q1 and Q2 the output voltage Q1 is  $V_S$  and Q2 is ground. This state will be detected by two comparators and an error flag will be set after a delay time of 50  $\mu\text{s}$ . Changing the inputs resets the error flip flop.



**Figure 3** Simplified Schematic for Open Load Detection

## Diagnosis

### 2 Diagnosis

Various errors as listed in the table "Diagnosis" are detected. Short circuits and overload result in turning off the output stages after a delay  $t_{dSD}$  and setting the error flag simultaneously [EF = L]. Changing the inputs to a state where the fault is not detectable resets the error flag (input toggling) with the exception of short circuit from OUT1 to OUT2 (load short circuit).

| Flag                               | IN1 | IN2 | OUT1    | OUT2    | EF | Remarks        | Nr. |
|------------------------------------|-----|-----|---------|---------|----|----------------|-----|
| Open circuit between OUT1 and OUT2 | 0   | 0   | H       | L       | 1  | Not detectable | 1   |
|                                    | 0   | 1   | L       | H       | 1  | Not detectable | 2   |
|                                    | 1   | 0   | L       | L       | 1  | Not detectable | 3   |
|                                    | 1   | 1   | Z       | Z       | 0  |                | 4   |
| Short circuit from OUT1 to OUT2    | 0   | 0   | $V_s/2$ | $V_s/2$ | 0  |                | 5   |
|                                    | 0   | 1   | $V_s/2$ | $V_s/2$ | 0  |                | 6   |
|                                    | 1   | 0   | L       | L       | 1  | Not detectable | 7   |
|                                    | 1   | 1   | Z       | Z       | 1  | Not detectable | 8   |
| Short circuit from OUT1 to GND     | 0   | 0   | GND     | L       | 0  |                | 9   |
|                                    | 0   | 1   | GND     | H       | 1  | Not detectable | 10  |
|                                    | 1   | 0   | GND     | L       | 1  | Not detectable | 11  |
|                                    | 1   | 1   | GND     | L       | 1  | Not detectable | 12  |
| Short circuit from OUT2 to GND     | 0   | 0   | H       | GND     | 1  | Not detectable | 13  |
|                                    | 0   | 1   | L       | GND     | 0  |                | 14  |
|                                    | 1   | 0   | L       | GND     | 1  | Not detectable | 15  |
|                                    | 1   | 1   | L       | GND     | 1  | Not detectable | 16  |
| Short circuit from OUT1 to $V_s$   | 0   | 0   | $V_s$   | L       | 1  | Not detectable | 17  |
|                                    | 0   | 1   | $V_s$   | H       | 0  |                | 18  |
|                                    | 1   | 0   | $V_s$   | H       | 0  |                | 19  |
|                                    | 1   | 1   | $V_s$   | H       | 1  | Not detectable | 20  |
| Short circuit from OUT2 to $V_s$   | 0   | 0   | H       | $V_s$   | 0  |                | 21  |
|                                    | 0   | 1   | L       | $V_s$   | 1  | Not detectable | 22  |
|                                    | 1   | 0   | H       | $V_s$   | 0  |                | 23  |
|                                    | 1   | 1   | H       | $V_s$   | 1  | Not detectable | 24  |
| Overtemperature or undervoltage    | 0   | 0   | Z       | Z       | 0  |                | 25  |
|                                    | 0   | 1   | Z       | Z       | 0  |                | 26  |
|                                    | 1   | 0   | Z       | Z       | 0  |                | 27  |
|                                    | 1   | 1   | Z       | Z       | 0  |                | 28  |

IN: 0 = Logic LOW    OUT: Z = Output in tristate condition    EF: 1 = No error  
      1 = Logic HIGH       =  $V_s/2$  due to internal Pull-up/down resistors       0 = Error  
      L = Output in sink condition  
      H = Output in source condition

## Electrical Characteristics

### 3 Electrical Characteristics

#### 3.1 Absolute Maximum Ratings

$$-40\text{ }^{\circ}\text{C} < T_j < 150\text{ }^{\circ}\text{C}$$

| Parameter | Symbol | Limit Values |      | Unit | Remarks |
|-----------|--------|--------------|------|------|---------|
|           |        | min.         | max. |      |         |

#### Voltages

|                            |             |       |    |   |                                       |
|----------------------------|-------------|-------|----|---|---------------------------------------|
| Supply voltage             | $V_S$       | - 0.3 | 40 | V | -                                     |
|                            |             | - 1   | 40 | V | $t < 0.5\text{ s}; I_S > -5\text{ A}$ |
| Logic input voltage        | $V_{IN1,2}$ | - 0.3 | 7  | V | $0\text{ V} < V_S < 40\text{ V}$      |
| Diagnostics output voltage | $V_{EF}$    | - 0.3 | 7  | V | -                                     |

#### Currents of DMOS-Transistors and Freewheeling Diodes

|                        |              |     |   |   |                                                                                          |
|------------------------|--------------|-----|---|---|------------------------------------------------------------------------------------------|
| Output current (cont.) | $I_{OUT1,2}$ | - 5 | 5 | A | -                                                                                        |
| Output current (peak)  | $I_{OUT1,2}$ | - 6 | 6 | A | $t_p < 100\text{ ms}; T = 1\text{ s}$                                                    |
| Output current (peak)  | $I_{OUT1,2}$ | -   | - | A | $t_p < 50\text{ }\mu\text{s}; T = 1\text{ s};$<br>internally limited;<br>see overcurrent |

#### Temperatures

|                      |           |      |     |                    |   |
|----------------------|-----------|------|-----|--------------------|---|
| Junction temperature | $T_j$     | - 40 | 150 | $^{\circ}\text{C}$ | - |
| Storage temperature  | $T_{stg}$ | - 50 | 150 | $^{\circ}\text{C}$ | - |

#### Thermal Resistances

|                  |            |   |    |     |                                 |
|------------------|------------|---|----|-----|---------------------------------|
| Junction case    | $R_{thjC}$ | - | 3  | K/W | P-TO220-7-11/12,<br>P-TO263-7-1 |
| Junction ambient | $R_{thjA}$ | - | 65 | K/W | P-TO220-7-11/12                 |
|                  |            | - | 75 | K/W | P-TO263-7-1                     |
| Junction case    | $R_{thjC}$ | - | 5  | K/W | P-DSO-20-12                     |
| Junction ambient | $R_{thjA}$ | - | 50 | K/W | P-DSO-20-12                     |

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

## Electrical Characteristics

### 3.2 Operating Range

| Parameter                 | Symbol       | Limit Values |               | Unit | Remarks                               |
|---------------------------|--------------|--------------|---------------|------|---------------------------------------|
|                           |              | min.         | max.          |      |                                       |
| Supply voltage            | $V_S$        | $V_{UV\ ON}$ | 40            | V    | After $V_S$ rising above $V_{UV\ ON}$ |
| Supply voltage increasing |              | – 0.3        | $V_{UV\ ON}$  | V    | Outputs in tristate condition         |
| Supply voltage decreasing |              | – 0.3        | $V_{UV\ OFF}$ | V    |                                       |
| Logic input voltage       | $V_{IN1, 2}$ | – 0.3        | 7             | V    | –                                     |
| Junction temperature      | $T_j$        | – 40         | 150           | °C   | –                                     |

### 3.3 Electrical Characteristics

6 V <  $V_S$  < 18 V; IN1 = IN2 = HIGH

$I_{OUT1, 2} = 0$  A (No load); – 40 °C <  $T_j$  < 150 °C; unless otherwise specified

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

#### Current Consumption

|                   |       |   |   |    |    |                                    |
|-------------------|-------|---|---|----|----|------------------------------------|
| Quiescent current | $I_S$ | – | – | 10 | mA | IN1 = IN2 = LOW;<br>$V_S = 13.2$ V |
|-------------------|-------|---|---|----|----|------------------------------------|

#### Under Voltage Lockout

|                       |               |     |     |     |   |                            |
|-----------------------|---------------|-----|-----|-----|---|----------------------------|
| UV-Switch-ON voltage  | $V_{UV\ ON}$  | –   | 5.3 | 6   | V | $V_S$ increasing           |
| UV-Switch-OFF voltage | $V_{UV\ OFF}$ | 3.5 | 4.7 | 5.6 | V | $V_S$ decreasing           |
| UV-ON/OFF-Hysteresis  | $V_{UV\ HY}$  | 0.2 | 0.6 | –   | V | $V_{UV\ ON} - V_{UV\ OFF}$ |

## Electrical Characteristics

### 3.3 Electrical Characteristics (cont'd)

$6\text{ V} < V_S < 18\text{ V}$ ; IN1 = IN2 = HIGH

$I_{\text{OUT}1,2} = 0\text{ A}$  (No load);  $-40\text{ }^{\circ}\text{C} < T_j < 150\text{ }^{\circ}\text{C}$ ; unless otherwise specified

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

### Outputs OUT1, 2

#### Static Drain-Source-On Resistance

|                                          |                      |   |     |      |    |                                                                               |
|------------------------------------------|----------------------|---|-----|------|----|-------------------------------------------------------------------------------|
| Source<br>$I_{\text{OUT}} = -3\text{ A}$ | $R_{\text{DS ON H}}$ | – | 220 | 350  | mΩ | $6\text{ V} < V_S < 18\text{ V}$<br>$T_j = 25\text{ }^{\circ}\text{C}$        |
|                                          |                      |   | –   | 500  | mΩ | $6\text{ V} < V_S < 18\text{ V}$                                              |
|                                          |                      |   | 350 | 500  | mΩ | $V_{\text{S ON}} < V_S \leq 6\text{ V}$<br>$T_j = 25\text{ }^{\circ}\text{C}$ |
|                                          |                      |   | –   | 800  | mΩ | $V_{\text{S ON}} < V_S \leq 6\text{ V}$                                       |
| Sink<br>$I_{\text{OUT}} = 3\text{ A}$    | $R_{\text{DS ON L}}$ | – | 230 | 350  | mΩ | $6\text{ V} < V_S < 18\text{ V}$<br>$T_j = 25\text{ }^{\circ}\text{C}$        |
|                                          |                      |   | –   | 500  | mΩ | $6\text{ V} < V_S < 18\text{ V}$                                              |
|                                          |                      |   | 400 | 600  | mΩ | $V_{\text{S ON}} < V_S \leq 6\text{ V}$<br>$T_j = 25\text{ }^{\circ}\text{C}$ |
|                                          |                      |   | –   | 1000 | mΩ | $V_{\text{S ON}} < V_S \leq 6\text{ V}$                                       |

Note: Values of  $R_{\text{DS ON}}$  for  $V_{\text{S ON}} < V_S \leq 6\text{ V}$  are guaranteed by design.

#### Overcurrent

|                           |                   |    |    |    |    |                                     |
|---------------------------|-------------------|----|----|----|----|-------------------------------------|
| Source shutdown trippoint | $-I_{\text{SDH}}$ | –  | –  | 10 | A  | $T_j = -40\text{ }^{\circ}\text{C}$ |
|                           |                   | –  | 8  | –  | A  | $T_j = 25\text{ }^{\circ}\text{C}$  |
|                           |                   | 6  | –  | –  | A  | $T_j = 150\text{ }^{\circ}\text{C}$ |
| Sink shutdown trippoint   | $I_{\text{SDL}}$  | –  | –  | 10 | A  | $T_j = -40\text{ }^{\circ}\text{C}$ |
|                           |                   | –  | 8  | –  | A  | $T_j = 25\text{ }^{\circ}\text{C}$  |
|                           |                   | 6  | –  | –  | A  | $T_j = 150\text{ }^{\circ}\text{C}$ |
| Shutdown delay time       | $t_{\text{dSD}}$  | 25 | 50 | 80 | μs | –                                   |

## Electrical Characteristics

### 3.3 Electrical Characteristics (cont'd)

$6\text{ V} < V_S < 18\text{ V}$ ;  $IN1 = IN2 = \text{HIGH}$

$I_{OUT1,2} = 0\text{ A}$  (No load);  $-40\text{ }^{\circ}\text{C} < T_j < 150\text{ }^{\circ}\text{C}$ ; unless otherwise specified

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

#### Short Circuit Current Limitation

|                |            |   |   |    |   |               |
|----------------|------------|---|---|----|---|---------------|
| Source current | $-I_{SCH}$ | – | – | 20 | A | $t < t_{dSD}$ |
| Sink current   | $I_{SCL}$  | – | – | 15 | A | $t < t_{dSD}$ |

#### Open Circuit

|                       |            |    |     |    |               |   |
|-----------------------|------------|----|-----|----|---------------|---|
| Pull up resistor      | $R_{UP}$   | 5  | 10  | 20 | k $\Omega$    | – |
| Pull down resistor    | $R_{DOWN}$ | 5  | 10  | 20 | k $\Omega$    | – |
| Switching threshold H | $V_{EH}$   | 2  | 2.5 | 3  | V             | – |
| Switching threshold L | $V_{EL}$   | 2  | 2.4 | 3  | V             | – |
| Detection delay time  | $t_{dSD}$  | 25 | 50  | 80 | $\mu\text{s}$ | – |

#### Output Delay Times (Device Active for $t > 1\text{ ms}$ )

|            |                      |   |    |    |               |                                           |
|------------|----------------------|---|----|----|---------------|-------------------------------------------|
| Source ON  | $t_{d\text{ ON H}}$  | – | 10 | 20 | $\mu\text{s}$ | $I_{OUT} = -3\text{ A}$<br>resistive load |
| Sink ON    | $t_{d\text{ ON L}}$  | – | 10 | 20 | $\mu\text{s}$ | $I_{OUT} = 3\text{ A}$<br>resistive load  |
| Source OFF | $t_{d\text{ OFF H}}$ | – | 2  | 5  | $\mu\text{s}$ | $I_{OUT} = -3\text{ A}$<br>resistive load |
| Sink OFF   | $t_{d\text{ OFF L}}$ | – | 2  | 5  | $\mu\text{s}$ | $I_{OUT} = 3\text{ A}$<br>resistive load  |

## Electrical Characteristics

### 3.3 Electrical Characteristics (cont'd)

$6\text{ V} < V_S < 18\text{ V}$ ;  $IN1 = IN2 = \text{HIGH}$

$I_{OUT1,2} = 0\text{ A}$  (No load);  $-40\text{ }^{\circ}\text{C} < T_j < 150\text{ }^{\circ}\text{C}$ ; unless otherwise specified

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

#### Output Switching Times (Device Active for $t > 1\text{ ms}$ )

|            |              |   |    |    |               |                                           |
|------------|--------------|---|----|----|---------------|-------------------------------------------|
| Source ON  | $t_{ON\ H}$  | – | 15 | 30 | $\mu\text{s}$ | $I_{OUT} = -3\text{ A}$<br>resistive load |
| Sink ON    | $t_{ON\ L}$  | – | 5  | 10 | $\mu\text{s}$ | $I_{OUT} = 3\text{ A}$<br>resistive load  |
| Source OFF | $t_{OFF\ H}$ | – | 2  | 5  | $\mu\text{s}$ | $I_{OUT} = -3\text{ A}$<br>resistive load |
| Sink OFF   | $t_{OFF\ L}$ | – | 2  | 5  | $\mu\text{s}$ | $I_{OUT} = 3\text{ A}$<br>resistive load  |

#### Clamp Diodes

##### Forward Voltage

|           |          |   |     |     |   |                    |
|-----------|----------|---|-----|-----|---|--------------------|
| High-side | $V_{FH}$ | – | 1   | 1.5 | V | $I_F = 3\text{ A}$ |
| Low-side  | $V_{FL}$ | – | 1.1 | 1.5 | V | $I_F = 3\text{ A}$ |

##### Leakage Current

|        |           |       |      |     |               |                     |
|--------|-----------|-------|------|-----|---------------|---------------------|
| Source | $I_{LKH}$ | – 100 | – 50 | –   | $\mu\text{A}$ | $OUT1 = V_S$        |
| Sink   | $I_{LKL}$ | –     | 50   | 100 | $\mu\text{A}$ | $OUT2 = \text{GND}$ |

#### Logic

##### Control Inputs IN 1, 2

|                             |            |      |     |     |               |                       |
|-----------------------------|------------|------|-----|-----|---------------|-----------------------|
| H-input voltage threshold   | $V_{INH}$  | 2.8  | 2.5 | –   | V             | –                     |
| L-input voltage             | $V_{INL}$  | –    | 1.7 | 1.2 | V             | –                     |
| Hysteresis of input voltage | $V_{INHY}$ | 0.4  | 0.8 | 1.2 | V             | –                     |
| H-input current             | $I_{INH}$  | – 2  | 0   | 2   | $\mu\text{A}$ | $V_{IN} = 5\text{ V}$ |
| L-input current             | $I_{INL}$  | – 10 | – 4 | 0   | $\mu\text{A}$ | $V_{IN} = 0\text{ V}$ |

## Electrical Characteristics

### 3.3 Electrical Characteristics (cont'd)

$6\text{ V} < V_S < 18\text{ V}$ ;  $IN1 = IN2 = \text{HIGH}$

$I_{OUT1,2} = 0\text{ A}$  (No load);  $-40\text{ }^{\circ}\text{C} < T_j < 150\text{ }^{\circ}\text{C}$ ; unless otherwise specified

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

#### Error Flag Output EF

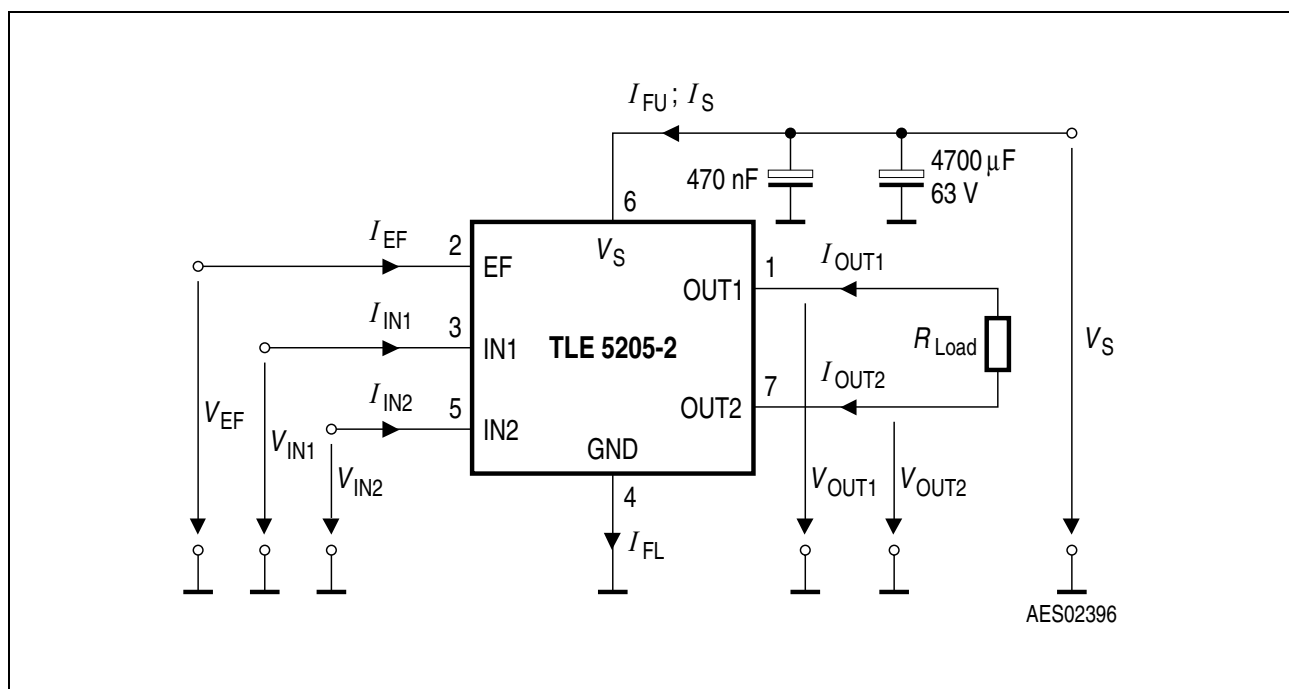
|                    |           |   |      |     |               |                        |
|--------------------|-----------|---|------|-----|---------------|------------------------|
| Low output voltage | $V_{EFL}$ | – | 0.25 | 0.5 | V             | $I_{EF} = 3\text{ mA}$ |
| Leakage current    | $I_{EFL}$ | – | –    | 10  | $\mu\text{A}$ | $V_{EF} = 7\text{ V}$  |

#### 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                 | $\Delta T$ | –   | 30  | –   | K                  | – |
| Shutdown delay time                    | $t_{dSD}$  | 25  | 50  | 80  | $\mu\text{s}$      | – |

*Note: Values of thermal shutdown are guaranteed by design.*

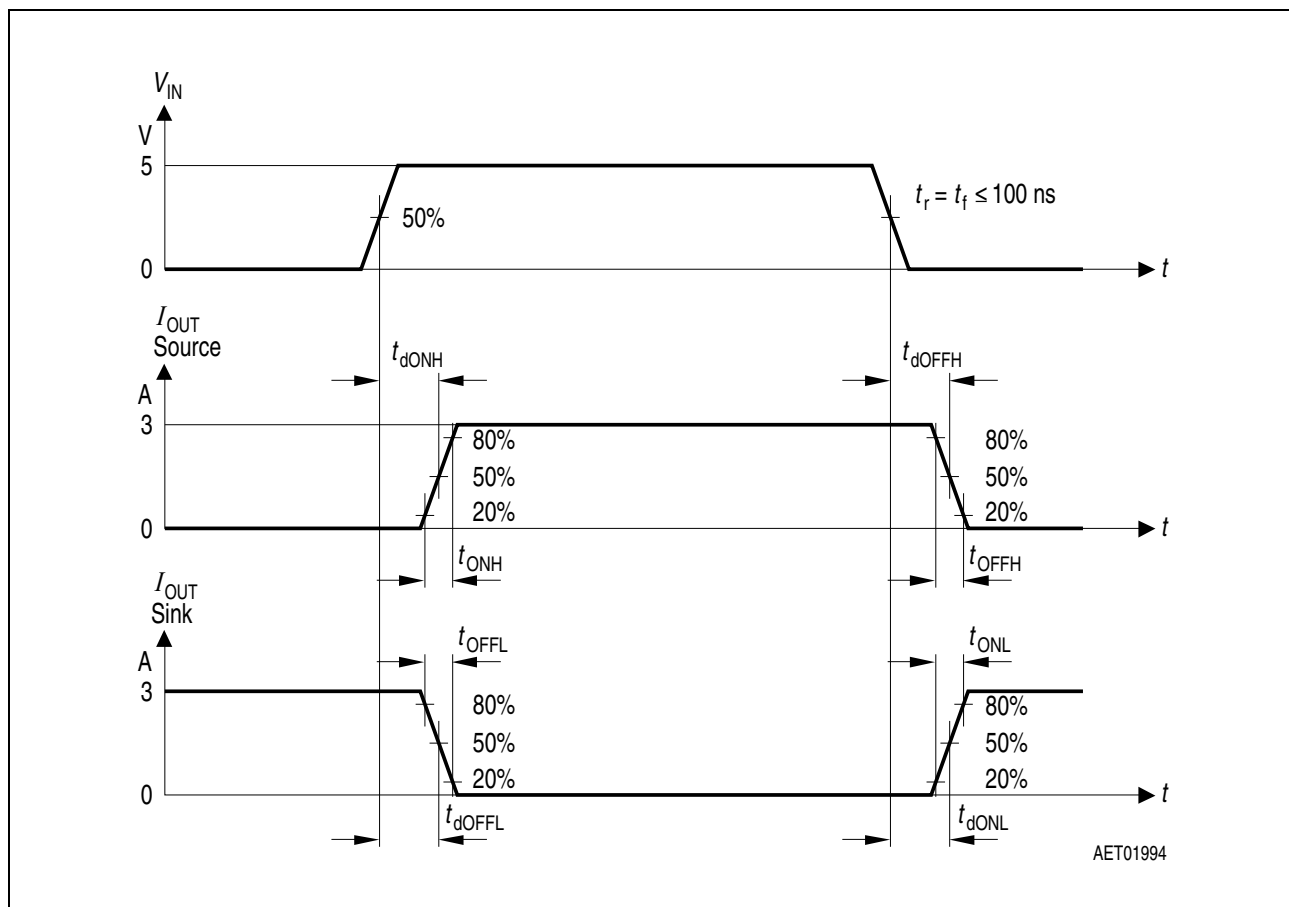
## Electrical Characteristics



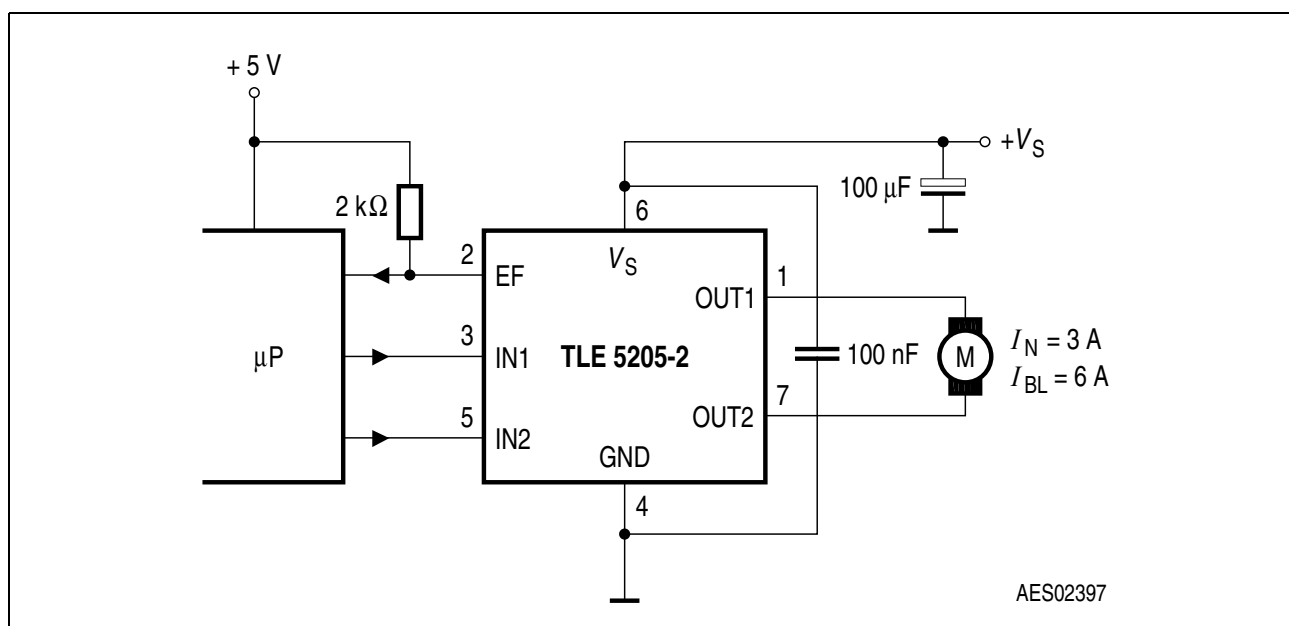
### Figure 4 Test Circuit

|           | Overcurrent | Short Circuit | Open Circuit |
|-----------|-------------|---------------|--------------|
| $I_{OUT}$ | $I_{SD}$    | $I_{SC}$      | $I_{OC}$     |

# Electrical Characteristics

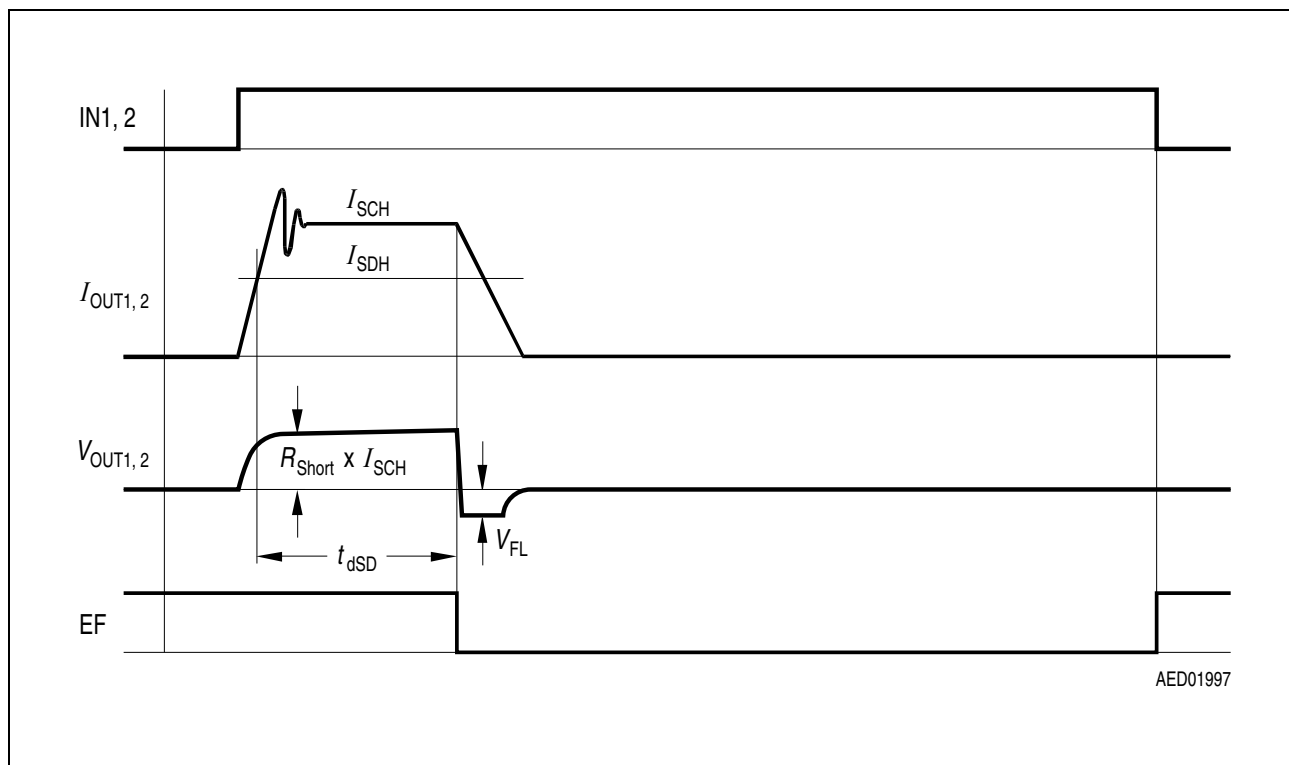


**Figure 5 Switching Time Definitions**

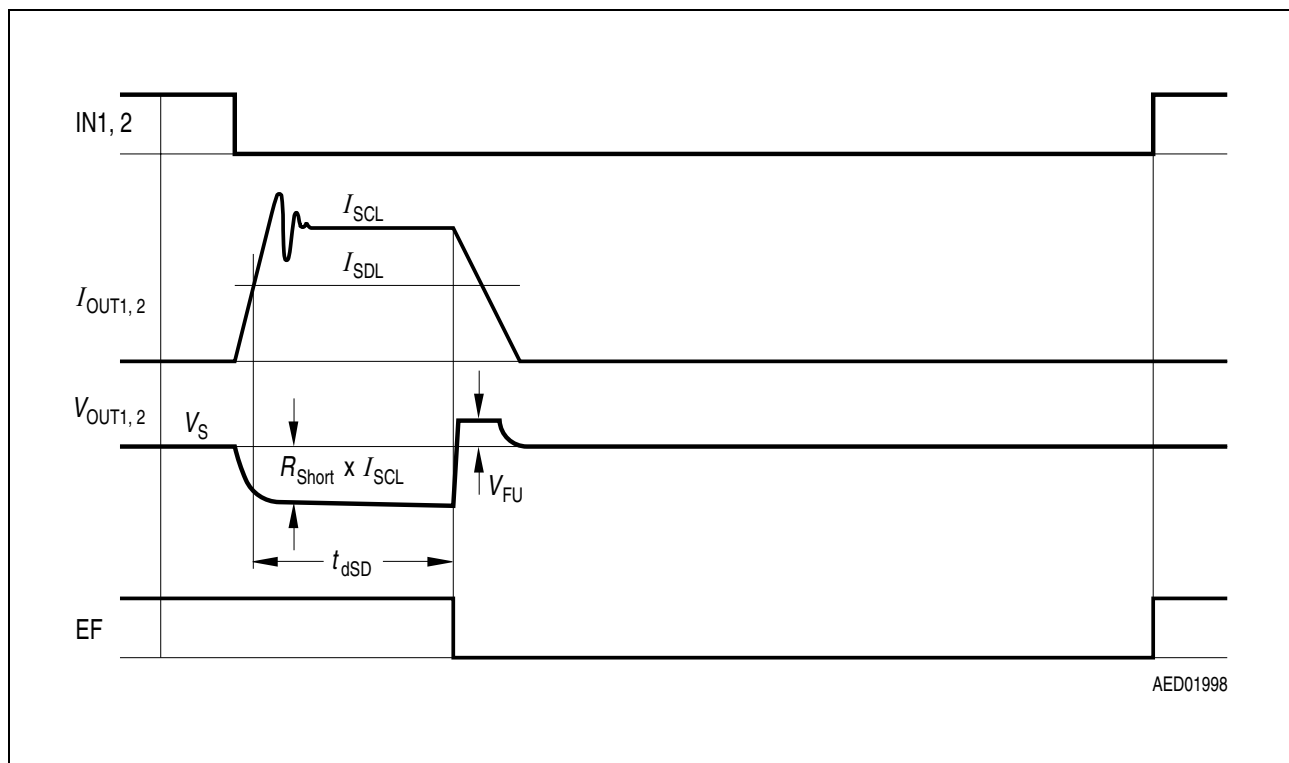


**Figure 6 Application Circuit**

# Electrical Characteristics



**Figure 7 Timing Diagram for Output Shorted to Ground**

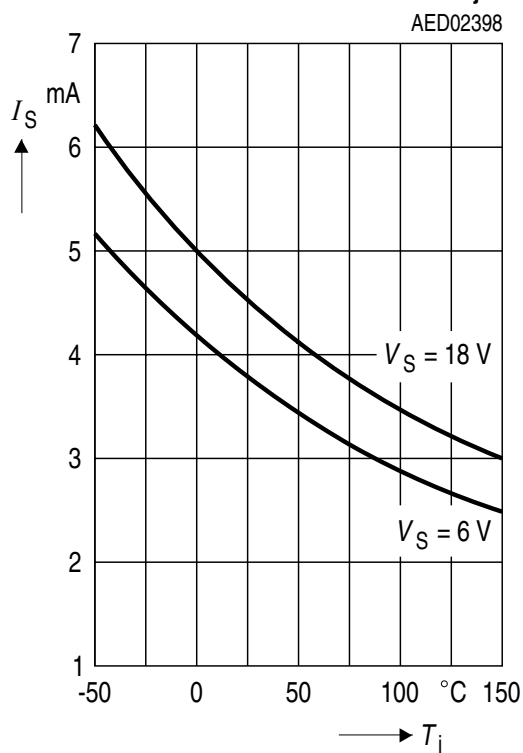


**Figure 8 Timing Diagram for Output Shorted to  $V_S$**

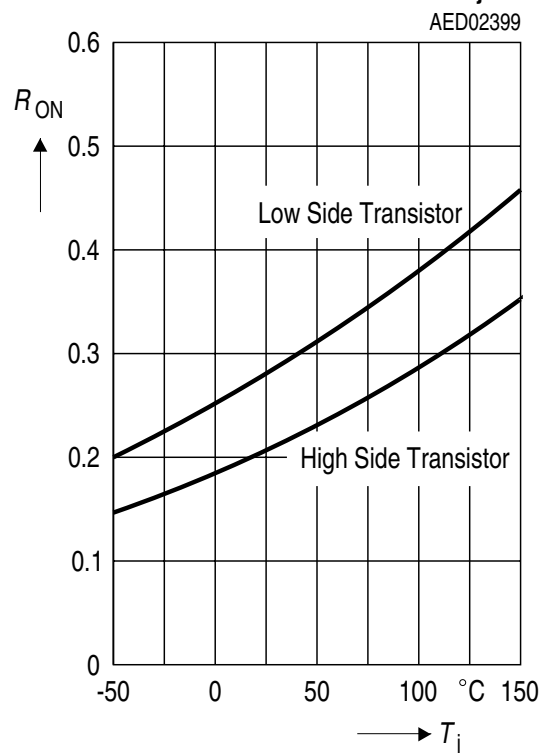
## Electrical Characteristics

### Diagrams

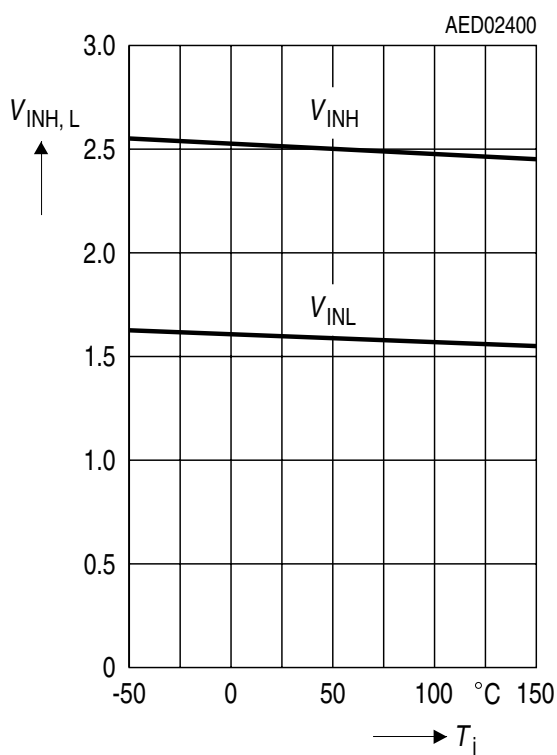
**Quiescent Current  $I_S$  (Active)  
versus Junction Temperature  $T_j$**



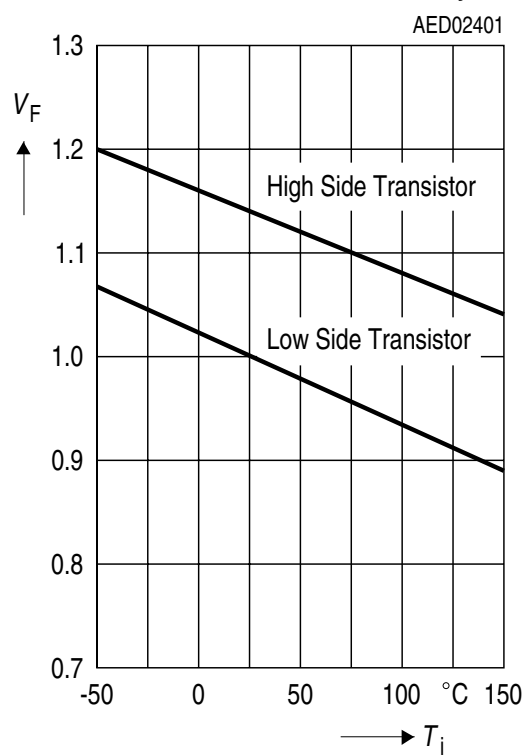
**Static Drain-Source ON-Resistance  
versus Junction Temperature  $T_j$**



**Input Switching Thresholds  $V_{INH, L}$   
versus Junction Temperature  $T_j$**

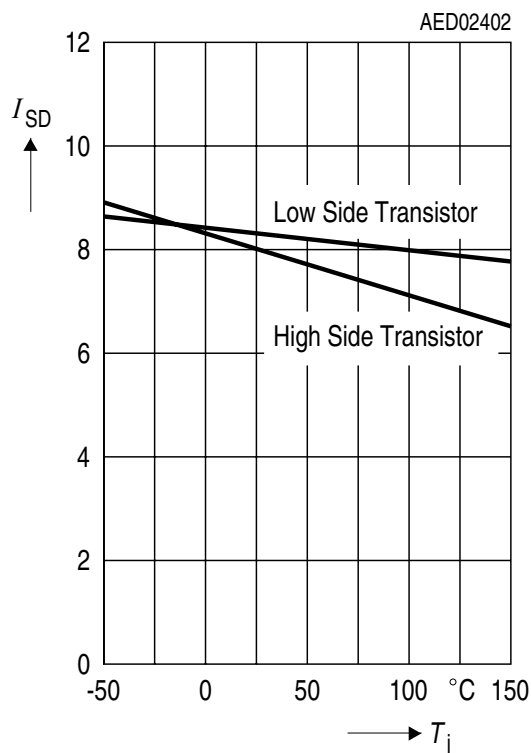


**Clamp Diode Forward Voltage  $V_F$   
versus Junction Temperature  $T_j$**

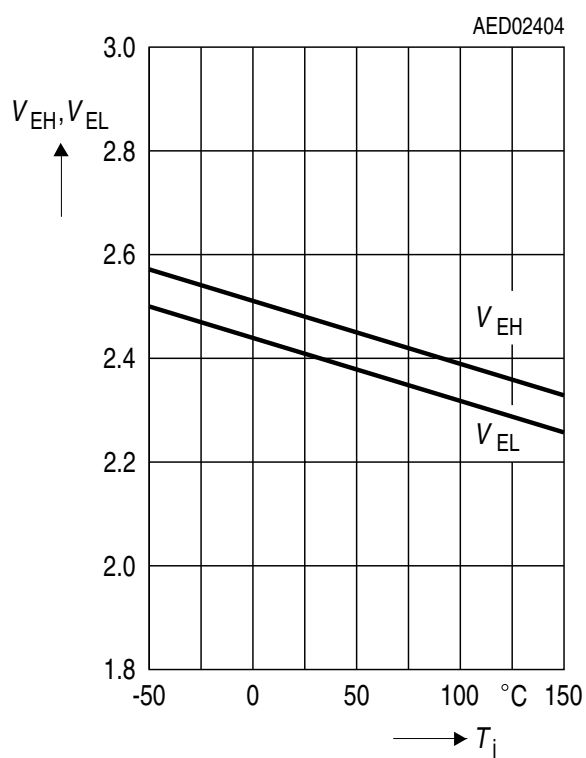


## Electrical Characteristics

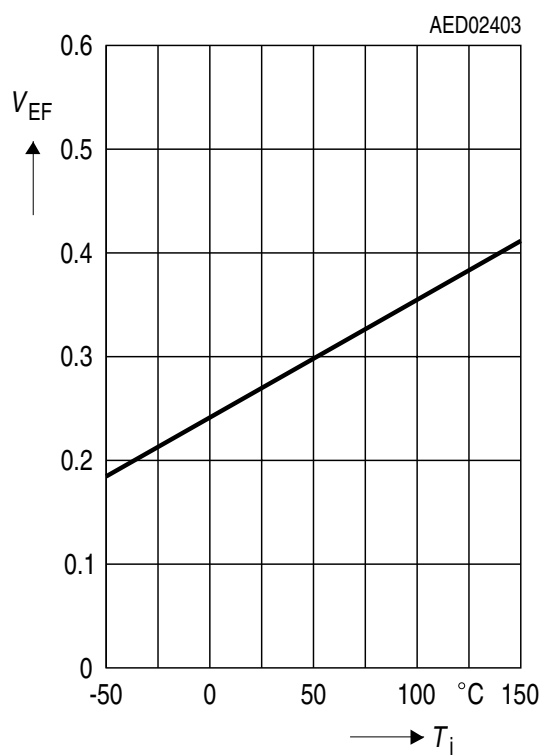
**Overcurrent Shutdown Threshold  $I_{SD}$  versus Junction Temperature  $T_j$**



**Switching Threshold  $V_{EH}$ ,  $V_{EL}$  versus Junction Temperature  $T_j$**



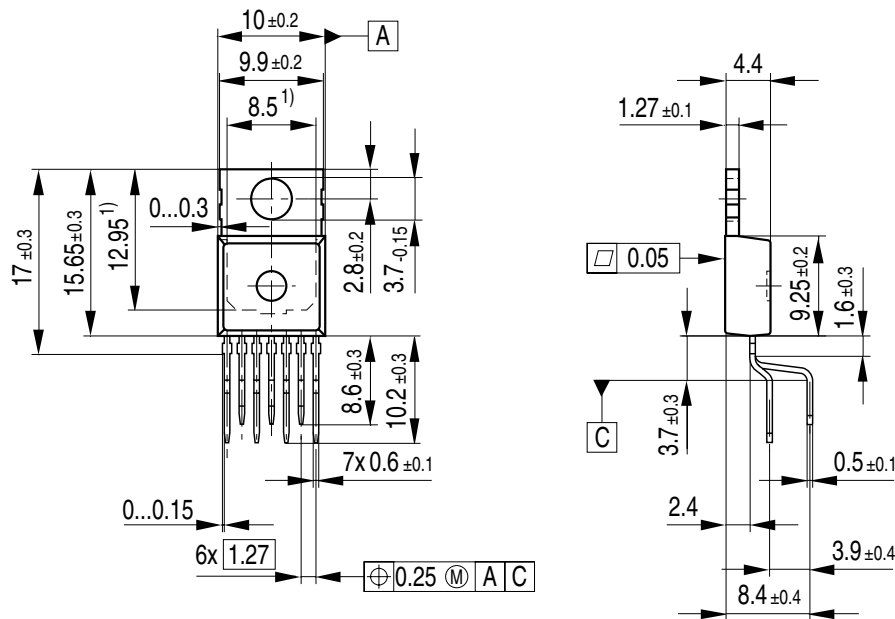
**Error-Flag Saturation Output Voltage  $V_{EF}$  versus Junction Temperature  $T_j$**



## 4 Package Outlines

### PG-TO220-7-11

(Plastic Transistor Single Outline Package)



<sup>1)</sup> Typical  
Metal surface min.  $X=7.25$ ,  $Y=12.3$   
All metal surfaces tin plated, except area of cut.

### 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).

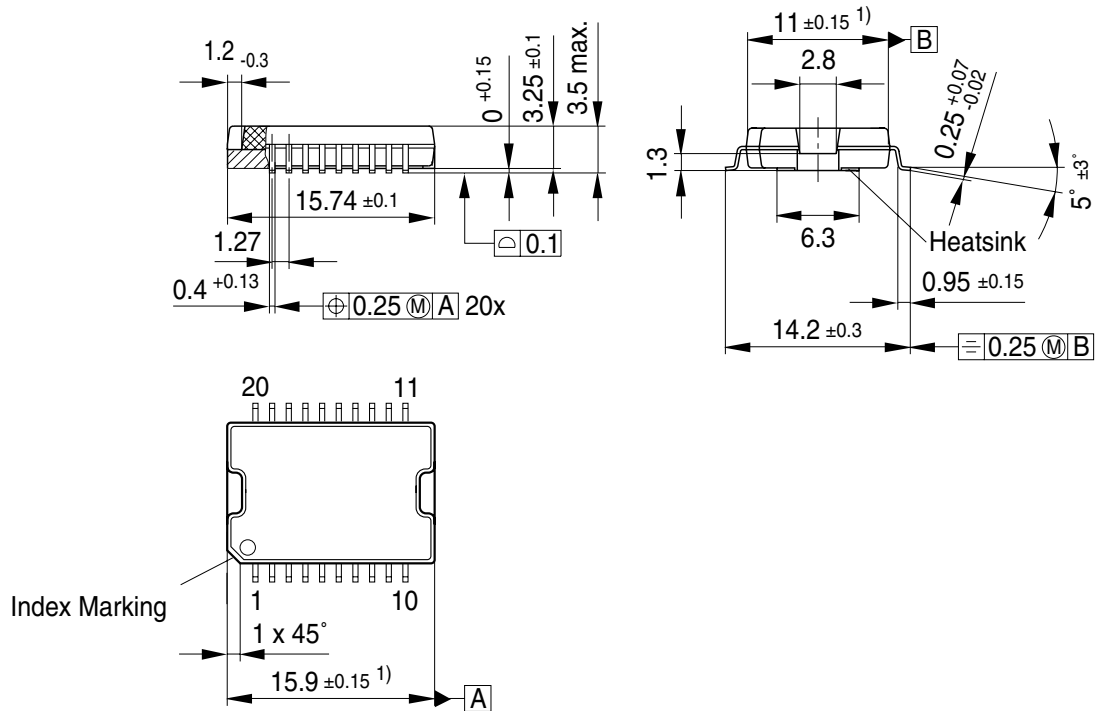
You can find all of our packages, sorts of packing and others in our Infineon Internet Page "Products": <http://www.infineon.com/products>.

SMD = Surface Mounted Device

Dimensions in mm

**PG-DSO-20-37**

(Plastic Dual Small Outline Package)



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

GPS05791

**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).

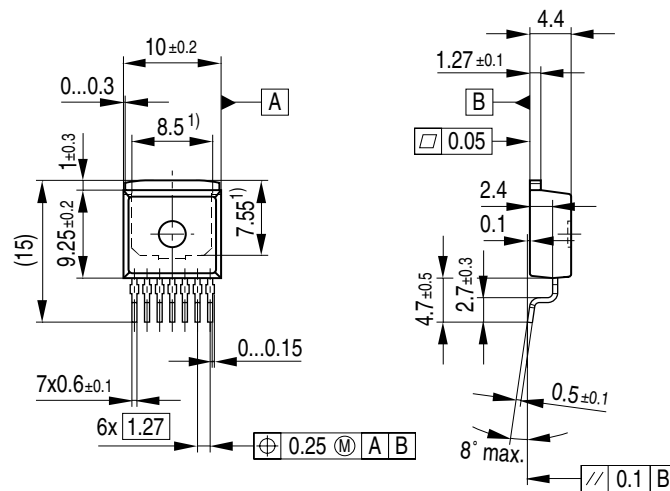
You can find all of our packages, sorts of packing and others in our Infineon Internet Page "Products": <http://www.infineon.com/products>.

SMD = Surface Mounted Device

Dimensions in mm

**PG-T0263-7-1**

(Plastic Transistor Single Outline Package)



1) Typical

Metal surface min. X=7.25, Y=6.9

All metal surfaces tin plated, except area of cut.

GPT09114

### 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).

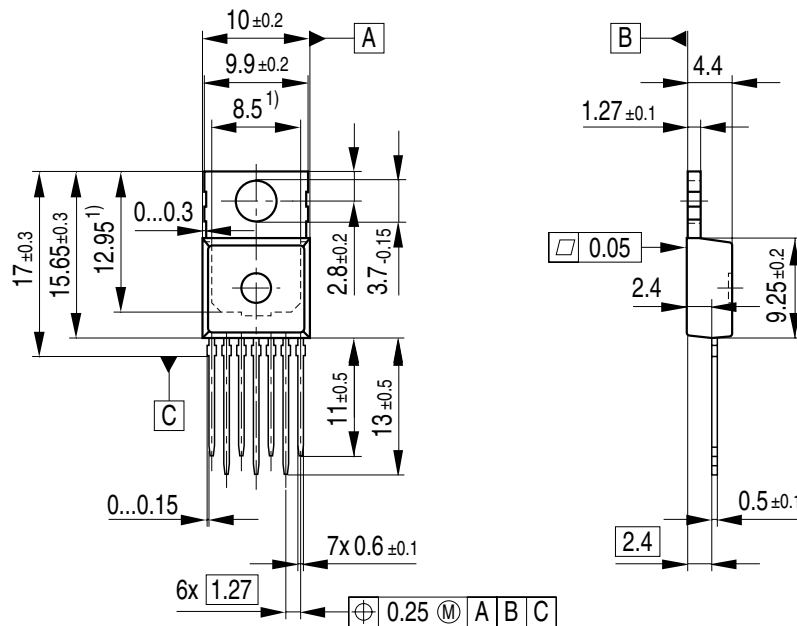
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SMD = Surface Mounted Device

Dimensions in mm

# PG-TO220-7-12

(Plastic Transistor Single Outline Package)



<sup>1)</sup> Typical

Metal surface min. X=7.25, Y=12.3

All metal surfaces tin plated, except area of cut.

## 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

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**Revision History****5 Revision History**

| Version  | Date       | Changes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rev. 1.1 | 2007-07-31 | <p>RoHS-compliant version of the TLE 5205-2</p> <ul style="list-style-type: none"><li>• All pages: Infineon logo updated</li><li>• Page 1:<br/>“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</li><li>• Page 20-23:<br/>Package names changed to RoHS compliant versions, “Green Product” description added</li><li>• Revision History added</li><li>• Legal Disclaimer added</li></ul> |

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