

FAQ List for TrilithIC Family

About this document

This application note lists frequently asked questions about TrilithIC family. The questions are organized in chapters based on their related topics. On the next page, a table of content containing all related topics is available.

The purpose of this document is to help our customers to solve common problems without spending time in searching application note. Not all details are described in this document. For the customers who need to know the details of this device, we highly recommend you to read our datasheet.

Please find here all information of the products in TrilithIC family:

- BTM7752G:
<https://www.infineon.com/cms/en/product/power/motor-control-ics/intelligent-motor-control-ics/integrated-full-bridge-driver/btm7752g/>
- BTM7750G:
<https://www.infineon.com/cms/en/product/power/motor-control-ics/intelligent-motor-control-ics/integrated-full-bridge-driver/btm7750g/>
- BTM7741G:
<https://www.infineon.com/cms/en/product/power/motor-control-ics/intelligent-motor-control-ics/integrated-full-bridge-driver/btm7741g/>
- BTM7740G:
<https://www.infineon.com/cms/en/product/power/motor-control-ics/intelligent-motor-control-ics/integrated-full-bridge-driver/btm7740g/>
- BTM7710G:
<https://www.infineon.com/cms/en/product/power/motor-control-ics/intelligent-motor-control-ics/integrated-full-bridge-driver/btm7710g/>
- BTM7700G:
<https://www.infineon.com/cms/en/product/power/motor-control-ics/intelligent-motor-control-ics/integrated-full-bridge-driver/btm7700g/>

We highly recommend our customers to use the newest product BTM7752G/BTM7755G. Datasheet of old products of TrilithIC family are available only upon request.

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1 TrilithIC Family Overview

1 TrilithIC Family Overview

The main features of TrilithIC family are summarized in the following table. Please select the product according to the application requirements (max. operation voltage/ protection features/ PWM frequency etc.). Please check the datasheets, if you need more detailed information.

		BTM7700G	BTM7710G	BTM7740G	BTM7741G	BTM7750G	BTM7751G	BTM7710GP	BTM7750GP	BTM7810K	BTM7811K	BTM7752G	BTM7755G
Normal operation voltage [V]		/	/	/	/	/	/	/	/	/	/	8 - 18	8 - 18
Max. Operation voltage [V]		40	40	40	40	40	40	40	40	40	40	28	28
Max. Temp. (°C)		150	150	150	150	150	150	110	110	110	110	150	150
Max. $R_{ds(on)}$ [mΩ]	LS	200	80	230	230	105	105	75	100	28	28	180	115
	HS	280	180	270	270	180	180	165	165	65	65	180	115
LS protection	overtemperature	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	short circuit to Vs	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
HS protection	overload	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	overtemperature	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	short circuit to Vs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
overload		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Open load detection		No	No	No	Yes	No	Yes	No	No	Yes	Yes	No	No
Undervoltage detection		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Current sense		No	No	No	No	No	No	No	No	No	No	Yes	No
Switching	LS	fast	fast	slow	slow	slow	slow	fast	slow	fast	fast	fast	medium
	HS	slow	slow	slow	slow	slow	slow	slow	slow	slow	slow	fast	medium

Figure 1

Since some of them will not be promoted anymore, we highly recommend our customers to select BTM7752G/ BTM7755G.

2 General Questions

1. What is the main application of TrilithIC?

BTM7752G/BTM7755G integrate two half bridges on chip. They can be used either as two half bridges or H-bridge. TrilithIC mainly targets the H-bridge applications which requires current up to 8 A with PWM frequency lower than 25 kHz(e.g. door lock). TrilithIC provides many diagnostics and protection functions as current sense, over-temperature protection, under-voltage protection, short circuit protection and current limitation... Therefore, it also fits to the applications which require the diagnostics and protections.

2. Which typical output current level can TrilithIC devices support?

The max. HS/LS continuous drain source current of BTM7752G/BTM7755G is 4 A. For applications with PWM, the max. output current highly depends on the PWM frequency and the duty cycle. But please be noticed that the max. output current is limited by the thermal performance and the current limitation level of the device. For BTM7752G and BTM7755G, the typical current limitation level is 12 A, the min. level is 8 A.

3. What is the operation voltage range of the TrilithIC family?

For BTM7752G/BTM7755G, the supply voltage range for normal operation range is 8 V to 18 V. It can be extended up to 28 V. But the specs in the datasheet are specified in the range of $V_S = 8 V$ to 18 V, and the overtemperature protection is only available up to 18 V.

4. Is it possible to use TrilithIC in safety related application?

TrilithIC products are not developed according to ISO26262. Infineon can provide FIT rates of the products on request to perform safety assessment on application level.

3 Current Sense Related Questions

1. What is the difference between the current sense ratio and the differential current sense ratio?

Current sense ratio is defined as $k_{ILIS} = I_L / I_{IS}$ (including offset current) . Differential current sense ratio is defined as $dk_{ILIS} = (I_{L1} - I_{L2}) / (I_{IS1} - I_{IS2})$. To calculate dk_{ILIS} , two different IS currents and output currents should be measured. In this case, the offset current can be compensated.

4 Protection Related Questions

2. How accurate is the current sense of the TrilithIC product?

In the datasheet of BTM7752G/BTM7755G, both current sense ratio(k_{ILIS}) and differential current sense ratio(dk_{ILIS}) are specified. Although the accuracy is not specified in the datasheet, k_{ILIS} and dk_{ILIS} can be used as a reference to implement the applications.

3. How is possible to calibrate the IS for higher accuracy level?

BTM7752G/BTM7755G has a current sense function with an IS-pin which provides the output current divided by a factor, so called dk_{ILIS} . The precision of the current measurement for the relative high load current whose corresponding IS current is above 0 A, could be improved by eliminating the IS-offset, dk_{ILIS} -production spread and respecting the temperature dependency of the dk_{ILIS} .

For high end applications, we recommend to measure two certain load currents whose corresponding IS currents are above 0 A at 25 °C (e.g. 3 A and 4 A), it is possible to determine the individual $dk_{ILIS-device}$ and store it permanently to the microcontroller of the application.

For the products in TrilithIC family, the IS-offset is not always positive. The IS-offset cancellation works for the load current with IS current above 0 A ($I_L > 0.5 A$). If the IS is 0 A ($I_L < 0.5 A$), the current sense shouldn't be use for measuring the load current.

For applications even require higher current sense accuracy, it is possible to measure the temperature on the PCB board and reduce the mismatch caused by temperature dependency. In this case, the dk_{ILIS} has to be measured at different temperatures. Temperature dependent dk_{ILIS} curve needs to be generated by curve fitting based on the measured dk_{ILIS} and stored in the micorcontroller. According to the measured temperature, the microcontroller can calculate the load current.

4 Protection Related Questions

1. Why does over temperature protection of BTM7752G is only available up to $V_s = 18 V$?

BTM7752G has a bipolar temperature sensor integrated into the P channel MOSFET. It works only up to 18 V and doesn't work in the extended operation range.

2. Which products have latched over temperature shutdown?

BTM7752G and BTM7755G have latched over temperature shutdown. The other products in the family overview table don't have latched over temperature shutdown.

5 PWM Related Questions

1. How is possible to use TrilithIC in PWM mode?

PWM signal can be applied at input pins to switch MOSFETs. BTM7752G and BTM7811K can be used with a PWM signal up to 25 KHz. But please be noticed that not all products in TrilithIC family can be used with such a high speed PWM signal. For other products please follow the max. PWM frequency specified in the datasheet.

2. How is possible to choose active freewheeling?

For customers who would like to choose active freewheeling, we highly recommend them to use BTM7752G/BTM7755G. The state of the MOSFETs is used to generate the shortest dead time and the shortest passive freewheeling time for these two products. For other products, it is difficult to use active freewheeling.

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