

How to use KTX9302 & KTX9602 Motor Control with Power Integrations™ BridgeSwitch™

Introduction

Both KTX9302 and KTX9602 are motor driver controller IC and support direct status communication with Power Integrations™ BridgeSwitch™ products. This application note is to describe the operation of relative registers in KTX9302 and KTX9602, and application diagrams are listed for reference.

Functional Description

Pin Assignment

The KTX9302 has one dedicated pin to connect with BridgeSwitch™ FAULT pin, and KTX9602 has 2 dedicated pins for the connection with BridgeSwitch™ FAULT pin.

Pin 29 of KTX9302 is defined as BS_FAULT1 when using with BridgeSwitch™.

Pin 45 of KTX9602 is defined as BS_FAULT1 and Pin 44 is defined as BS_FAULT2 when using with BridgeSwitch™.

Register Map

Hex Address	Name	Type	Access	Default Reset	B7	B6	B5	B4	B3	B2	B1	B0
0x00	Status	Status	R	1000 0000	Run	bs_fault	OT	g_fault[1:0]		over_curr[2:0]		
0x01	Config	Config	R/W	0000 0000	bs_start	bs_config	Fb_config	Motor_config[1:0]		BS_shut down	BS_enable[1:0]	
0xEC	Bs_status11	Status	R	0000 0000	Bs_status11[7:0]							
0xED	Bs_status12	Status	R	0000 0000	Bs_status12[7:0]							
0xEE	Bs_status13	Status	R	0000 0000	Bs_status13[7:0]							
0xEF	Bs_status21	Status	R	0000 0000	Bs_status21[7:0]							
0xF0	Bs_status22	Status	R	0000 0000	Bs_status22[7:0]							
0xF1	Bs_status23	Status	R	0000 0000	Bs_status23[7:0]							

Application information

Config (0x01)

Config is the read-write register for BridgeSwitch™ function setting, except setting up the configuration of KTX9302 and KTX9602.

Register	Address	Bit							
		7	6	5	4	3	2	1	0
Config[7:0]	01h	bs_start	bs_config	Fb_config	motor_config[1:0]	BS_shutdown	BS_enable[1:0]		

bs_start: Start status requesting of BridgeSwitch™

Set “bs_start” bit to “1” is requesting all BridgeSwitch™ parts to update the current status or reset then update status, according to bs_config bit setting.

The “bs_start” will automatic clear after sending out the request though “BS_FAULT1” and “BS_FAULT2” pins.

bs_config: BridgeSwitch™ status request configuration

Set “0” for reset all bridge switch and update the status.

Set “1” for update current status only.

BS_shutdown: BridgeSwitch™ Fault Shutdown Enable

Enable the shutdown function for BridgeSwitch™ protection

0 : Disable BS Shutdown

1 : Enable BS Shutdown

The fault action detail is shown on below table.

BridgeSwitch™ Fault	Fault ID	KTX9302/KTX9602 Action
Device Ready	0000000	None
HV Bus Over Voltage	001xxxx	Shutdown / Warning
HV 100%	010xxxx	Warning
HV Bus 85%	011xxxx	Warning
HV Bus 70%	100xxxx	Warning
HV Bus 55%	101xxxx	Warning
System Thermal	110xxxx	Shutdown / Warning
LS Driver Not Ready	111xxxx	Shutdown / Warning
LS FET Thermal Warning	xxx010x	Warning
LS FET Thermal Shutdown	xxx10xx	Shutdown / Warning
LS FET Over-Current	xxxx1x	Shutdown / Warning
HS Driver Not Ready	xxx11xx	Shutdown / Warning
HS FET Over-Current	xxxxxx1	Shutdown / Warning

BS_enable [1:0]: BS_FAULT1/2 pin enable

BS_enable[1]	BS_enable[0]	Description
0	0	No BridgeSwitch™ in use
1	0	BS_FAULT1 is used
0	1	BS_FAULT2 is used
1	1	Both of BS_FAULT1 and BS_FAULT2 are used

Description of BridgeSwitch™ Status

- The corresponding relations between the Power Integrations™ BridgeSwitch™ Device ID and BS_Status_xx is as below:

ID 1/Ch1	ID 2/Ch1	ID 3/Ch1	ID 1/Ch2	ID 2/Ch2	ID 3/Ch2
BS_Status_11	BS_Status_12	BS_Status_13	BS_Status_21	BS_Status_22	BS_Status_23

Below table lists the device ID of Power Integrations™ BridgeSwitch™ part, resulting device ID time period t_{ID} , and how to program the respective ID through ID pin connection.

Device ID	t_{ID}	ID Pin Connection
1	40 μ s	BPL Pin
2	60 μ s	Floating
3	80 μ s	SG Pin

Device ID Selection through ID Pin.

- The corresponding relations between BS_Status_xx and Power Integrations™ BridgeSwitch™ part's status is as below:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
BrSw Exist	BrSw Bit0	BrSw Bit1	BrSw Bit2	BrSw Bit3	BrSw Bit4	BrSw Bit5	BrSw Bit6

- The details of BridgeSwitch™ status are as below:

BridgeSwitch™ FAULT	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6
HV bus OV	0	0	1				
HV bus UV 100%	0	1	0				
HV bus UV 85%	0	1	1				
HV bus UV 70%	1	0	0				
HV bus UV 55%	1	0	1				
System thermal fault	1	1	0				
S Driver not ready ¹	1	1	1				
LS FET thermal warning				0	0		
LS FET thermal shutdown				1	0		
HS Driver not ready ²				1	1		
LS FET over-current						1	
HS FET over-current							1
Device Ready (no faults)	0	0	0	0	0	0	0

1. Includes XL pin open/short-circuit fault, IPH pin to XL pin short circuit, and trim bit corruption.

2. Includes HS-to-LS communication loss, VBPH or internal 5 V rail out of range, and XH pin open/short-circuit fault.

Typical Application Diagrams

3-wire Half-Bridge Application Circuit

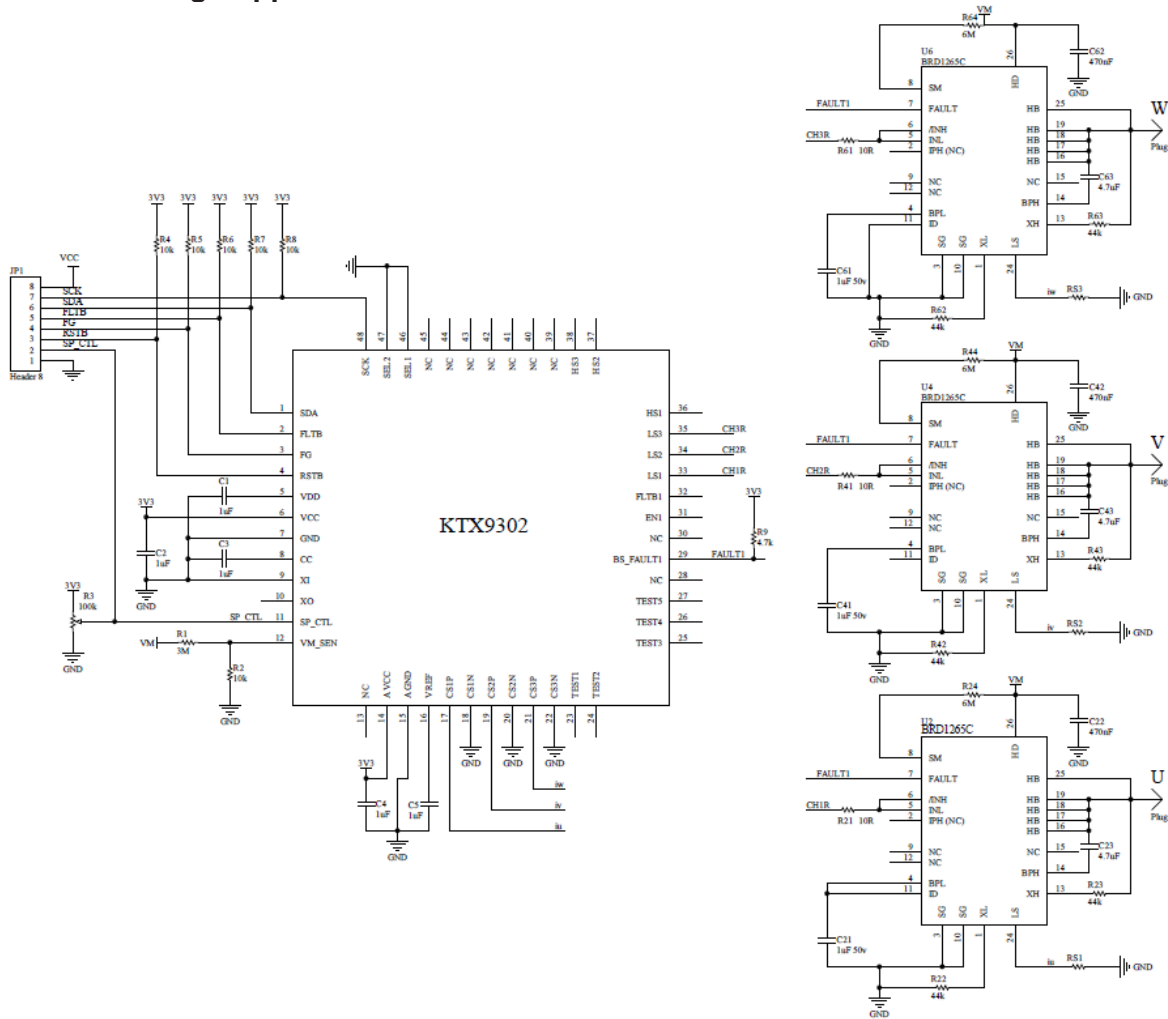


Figure 1. KTX9302 3-wire Motor Driver with BridgeSwitch™

6-wire Full-Bridge Application Circuit³

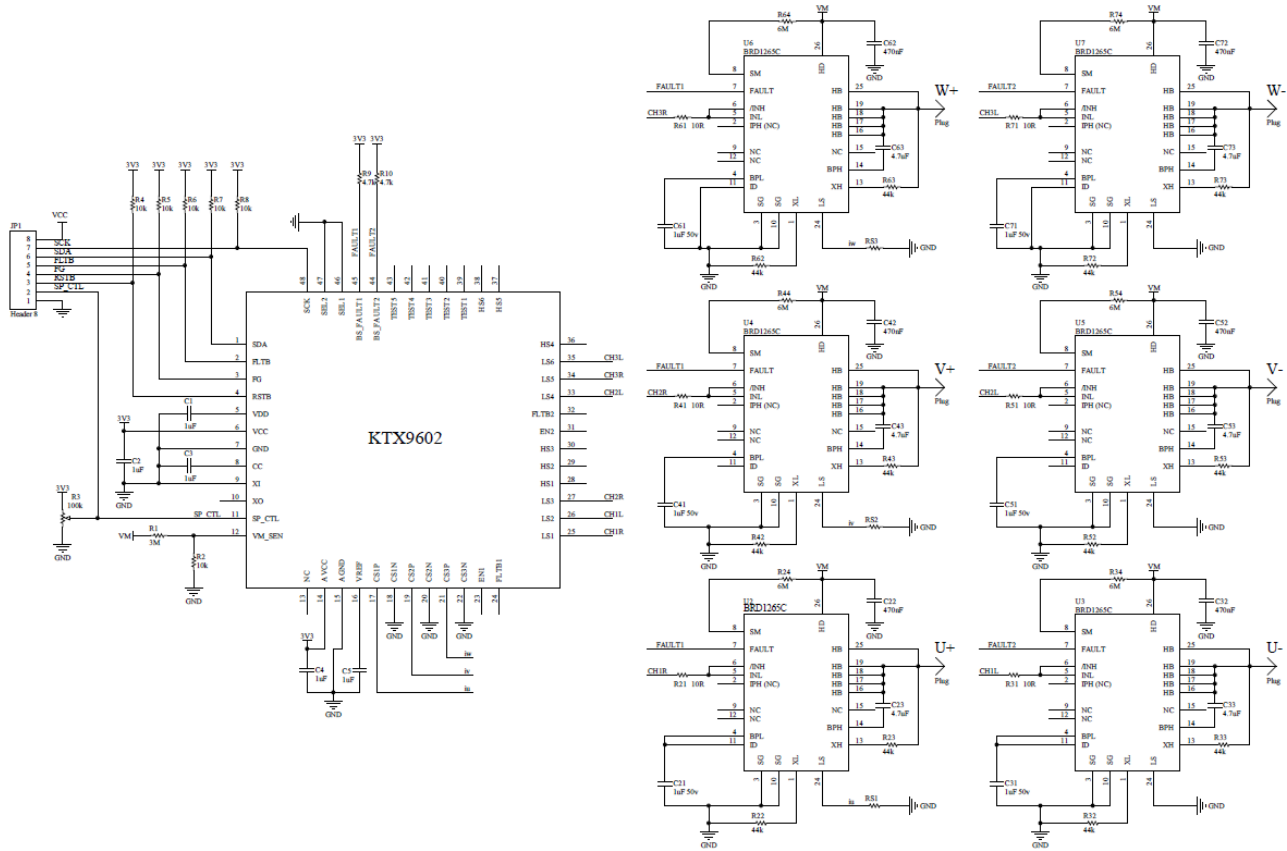


Figure 2. KTX9602 6-wire Motor Driver with BridgeSwitch™

3. If there are any questions about this implementation, please contact Kinetic Technologies.

Related Documentation

1. Kinetic Technologies Datasheet: KTX9302, KTX9602 Datasheet

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