

THREE PHASE BRIDGE MOSFET POWER MODULE 3

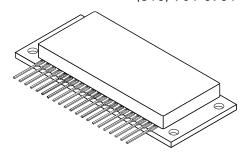
M.S.KENNEDY CORP.

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FEATURES:

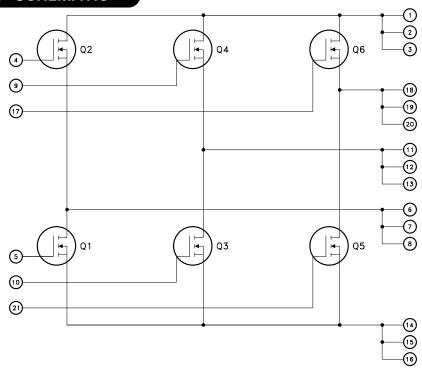
- All N-Channel Mosfets
- · Isolated Package for Direct Heat Sinking, Excellent Thermal Conductivity
- · Avalanche Rated Devices
- · Interfaces with Most Brushless Motor Drive IC's
- 100 Volt, 23 Amp Full Three Phase Bridge at 25°C



DESCRIPTION:

The MSK 3015 is an all N-Channel three phase power MOSFET Bridge Circuit. Packaged in a space efficient isolated ceramic tab power SIP that allows for direct heat sinking, the MSK 3015 can be interfaced with a wide array of brushless motor drive IC's. The MSK 3015 uses M.S Kennedy's proven power hybrid technology to produce a cost effective high performance circuit for use in today's sophisticated servo motor and disk drive systems.

EQUIVALENT SCHEMATIC



TYPICAL APPLICATIONS

- Three Phase Brushless DC Motor Servo Control
- Disk Drive Spindle Control
- Fin Actuator Control
- · Az-El Antenna Control

PIN-OUT INFORMATION

1 Drain Q2, Q4, Q6 2 Drain Q2, Q4, Q6

3 Drain Q2, Q4, Q6

4 Gate Q2

5 Gate Q1

6 Drain Q1, Source Q2

Drain Q1, Source Q2

8 Drain Q1, Source Q2

9 Gate Q4

10 Gate Q3

1

11 Drain Q3, Source Q4

12 Drain Q3, Source Q4

13 Drain Q3, Source Q4

14 Source Q1, Q3, Q5

15 Source Q1, Q3, Q5

16 Source Q1, Q3, Q5

17 Gate Q6

18 Drain Q5, Source Q6

19 Drain Q5, Source Q6

20 Drain Q5, Source Q6

21 Gate Q5

ABSOLUTE MAXIMUM RATINGS

Vdss Vdgdr	Drain to Source Voltage 100V MAX Drain to Gate Voltage	Single Pulse Avalanche Energy 830 mJ T _J Junction Temperature +150°C MAX
	$(RGS = 1M\Omega)$ 100V MAX	T _{ST} Storage Temperature55°C to +150°C
Vgs	Gate to Source Voltage	Tc Case Operating Temperature Range -55°C to +125°C
	(Continuous) ± 20V MAX	T _{LD} Lead Temperature Range
ID	Continuous Current 23A MAX	(10 Seconds)
IDM	Pulsed Current 41A MAX	
RTH-JC	Thermal Resistance	
	(Junction to Case)@25°C 1.2°C/W	
Rтн-JC	Thermal Resistance	
	(Junction to Case)@125°C 2.0°C/W	

ELECTRICAL SPECIFICATIONS

Parameter	Total Constitutions (2)		MSK3015			
Farameter	Test Conditions ④	Min.	Тур.	Max.	Units	
Drain-Source Breakdown Voltage	Vgs=0 ID=0.25mA	100	-	-	V	
Drain-Source Leakage Current	$V_{DS} = 100V V_{GS} = 0V$	-	-	250	μΑ	
Gate-Source Leakage Current	$V_{GS} = \pm 20V V_{DS} = 0$	-	-	±100	nA	
Gate-Source Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250\mu A$	2.0	-	4.0	V	
Drain-Source On Resistance ②	Vgs = 10V ID = 23A	-	-	0.09	Ω	
Drain-Source On Resistance ③	Vgs = 10V ID = 23A	-	-	0.06	Ω	
Forward Transconductance ①	VDS = 25V ID = 23A	13	-	-	S	
Total Gate Charge ①	ID = 23A	-	-	140	nC	
Gate-Source Charge ①	$V_{DS} = 80V$	-	-	29	nC	
Gate-Drain Charge 1	Vgs = 10V	-	-	68	nC	
Turn-On Delay Time ①	$V_{DD} = 50V$	-	16	-	nS	
Rise Time ①	ID = 23A	-	120	-	nS	
Turn-Off Delay Time ①	$R_G = 6.2\Omega$	-	60	-	nS	
Fall Time ①	$R_D = 1.2\Omega$	-	81	-	nS	
Input Capacitance ①	V _{GS} = 0V	-	2800	-	pF	
Output Capacitance ①	$V_{DS} = 25V$	-	1100	-	pF	
Reverse Transfer Capacitance ①	f = 1MHz	-	280	-	pF	
Body Diode		•				
Forward On Voltage ①	Is = 23 A VGS = 0V	-	2.5	-	V	
Reverse Recovery Time ①	$Is = 23 A di/dt = 100A/\mu S$	-	220	330	nS	
Reverse Recovery Charge ①			1.9	2.9	μC	

NOTES:

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This parameter is guaranteed by design but need not be tested. Typical parameters are representative of actual device performance but are for reference only.
 Resistance as seen at package pins.
 Resistance for die only; use for thermal calculations.
 TA = 25°C unless otherwise specified.

APPLICATION NOTES

BRIDGE DRIVE CONSIDERATIONS

It is important that the logic used to turn ON and OFF the various transistors allow sufficient "dead time" between a high side transistor and its low side transistor to make sure that at no time are they both ON. When they are, this is called "shoot-through", and it places a momentary short across the power supply. This overly stresses the transistors and causes excessive noise as well. See Figure 1.

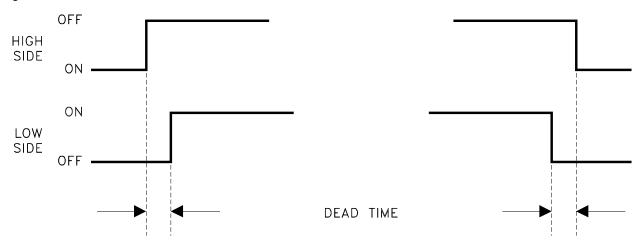


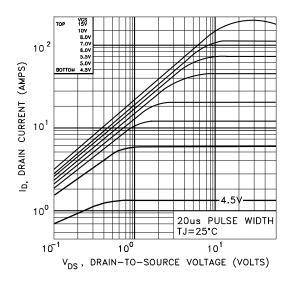
Figure 1

This deadtime should allow for the turn on and turn off time of the transistors, especially when slowing them down with gate resistors. This situation will be present when switching motor direction, or when sophisticated timing schemes are used for servo systems such as locked antiphase PWM'ing for high bandwidth operation.

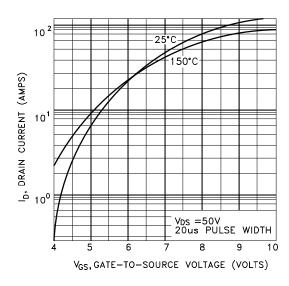
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TYPICAL PERFORMANCE CURVES

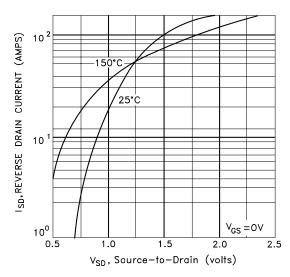
TYPICAL OUTPUT CHARACTERISTICS T_C = 25°C



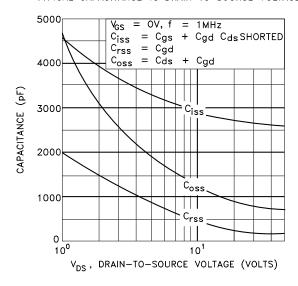
TYPICAL TRANSFER CHARACTERISTICS



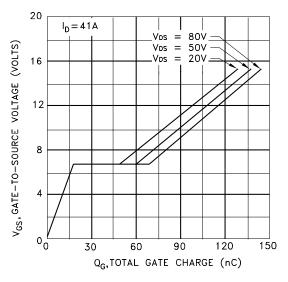
TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE



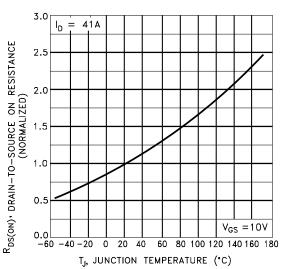
TYPICAL CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



TYPICAL GATE CHARGE vs GATE TO SOURCE VOLTAGE (VOLTS)



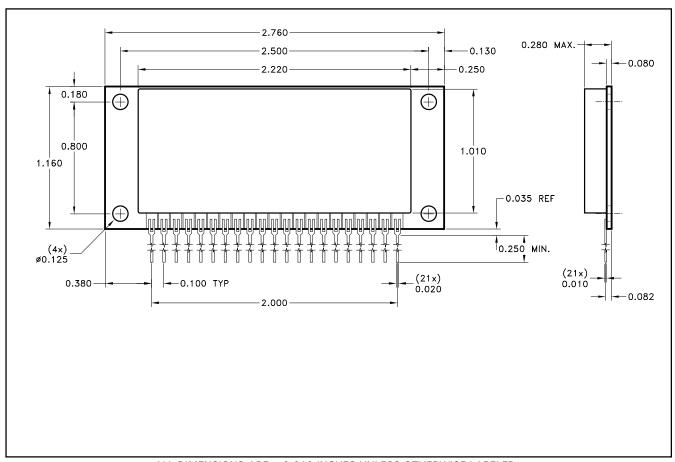
NORMALIZED ON-RESISTANCE vs TEMPERATURE



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MECHANICAL SPECIFICATIONS



ALL DIMENSIONS ARE ± 0.010 INCHES UNLESS OTHERWISE LABELED.

ORDERING INFORMATION

Part Number	Screening Level	
MSK 3015	Industrial	

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