THREE PHASE BRIDGE MOSFET POWER MODULE 3016

M.S.KENNEDY CORP.
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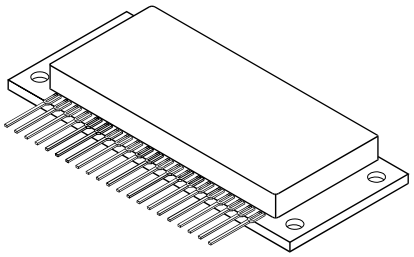


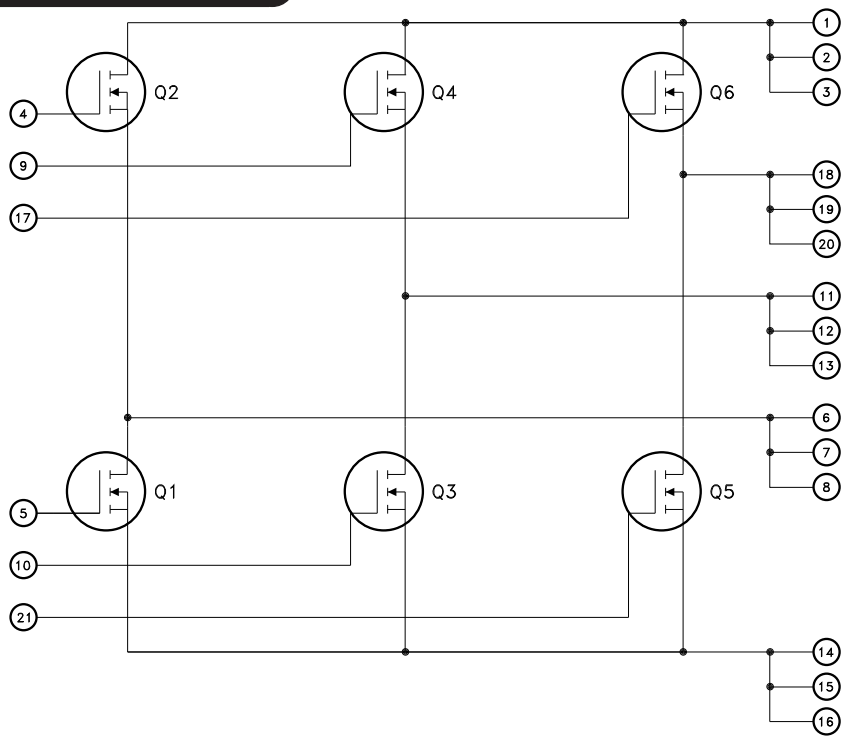
FEATURES:

- All N-Channel Mosfets
- Isolated Package for Direct Heat Sinking, Excellent Thermal Conductivity
- Avalanche Rated Devices
- Interfaces with Most Brushless Motor Drive IC's
- 200 Volt, 20 Amp Full Three Phase Bridge at 25°C

DESCRIPTION:

The MSK 3016 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 3016 can be interfaced with a wide array of brushless motor drive IC's. The MSK 3016 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
7	Drain Q1, Source Q2
8	Drain Q1, Source Q2
9	Gate Q4
10	Gate Q3
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

V_{DSS}	Drain to Source Voltage	200V MAX
V_{DGDR}	Drain to Gate Voltage (R_{GS} = 1MΩ)	200V MAX
V_{GS}	Gate to Source Voltage (Continuous)	±20V MAX
I_D	Continuous Current	20A MAX
I_{DM}	Pulsed Current	30A MAX
R_{TH-JC}	Thermal Resistance (Junction to Case)@25°C	1.3°C/W
R_{TH-JC}	Thermal Resistance (Junction to Case)@125°C	2.1°C/W
	Single Pulse Avalanche Energy	410 mJ
T_J	Junction Temperature	+150°C MAX
T_{ST}	Storage Temperature	-55°C to +150°C
T_C	Case Operating Temperature Range	-55°C to +125°C
T_{LD}	Lead Temperature Range (10 Seconds Lead Only)	200°C MAX

ELECTRICAL SPECIFICATIONS

Parameter	Test Conditions ④	MSK30016 Min.	MSK30016 Typ.	MSK30016 Max.	Units
Drain-Source Breakdown Voltage	V_{GS} = 0 I_D = 0.25mA	200	-	-	V
Drain-Source Leakage Current	V_{DS} = 200V V_{GS} = 0V	-	-	250	μA
Gate-Source Leakage Current	V_{GS} = ±20V V_{DS} = 0	-	-	±100	nA
Gate-Source Threshold Voltage	V_{DS} = V_{GS} I_D = 250μA	2.0	-	4.0	V
Drain-Source On Resistance ②	V_{GS} = 10V ID = 20A	-	-	0.12	Ω
Drain-Source On Resistance ③	V_{GS} = 10V I_D = 20A	-	-	0.09	Ω
Forward Transconductance ①	V_{DS} = 50V I_D = 20A	2.7	-	-	S
Total Gate Charge ①	I_D = 20A	-	-	140	nC
Gate-Source Charge ①	V_{DS} = 160V	-	-	28	nC
Gate-Drain Charge ①	V_{GS} = 10V	-	-	74	nC
Turn-On Delay Time ①	V_{DD} = 100V	-	16	-	nS
Rise Time ①	I_D = 20A	-	86	-	nS
Turn-Off Delay Time ①	R_G = 6.2Ω	-	70	-	nS
Fall Time ①	R_D = 3.2Ω	-	62	-	nS
Input Capacitance ①	V_{GS} = 0V	-	2800	-	pF
Output Capacitance ①	V_{DS} = 25V	-	780	-	pF
Reverse Transfer Capacitance ①	f = 1MHz	-	250	-	pF
Body Diode					
Forward On Voltage ①	I_S = 20 A V_{GS} = 0V	-	2.0	-	V
Reverse Recovery Time ①	I_S = 20 A di/dt = 100A/μS	-	360	540	nS
Reverse Recovery Charge ①		-	4.6	6.9	μC

NOTES:

① This parameter is guaranteed by design but need not be tested. Typical parameters are representative of actual device performance but are for reference only.
② Resistance as seen at package pins.
③ Resistance for die only; use for thermal calculations.
④ T_A = 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.

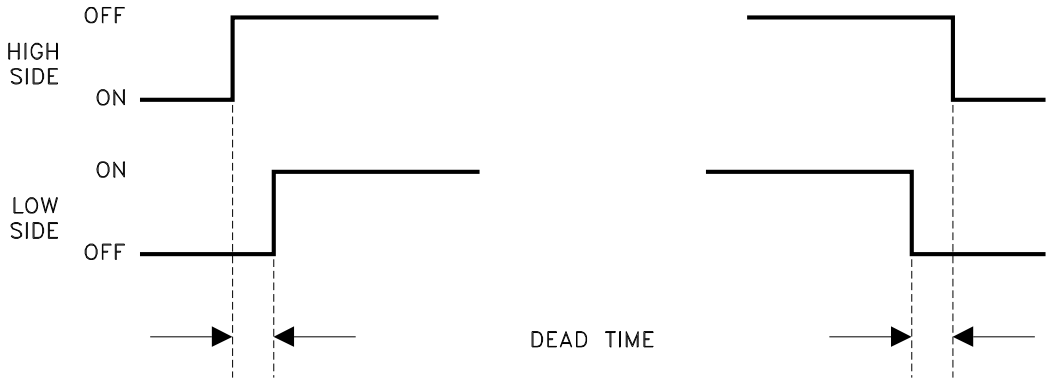
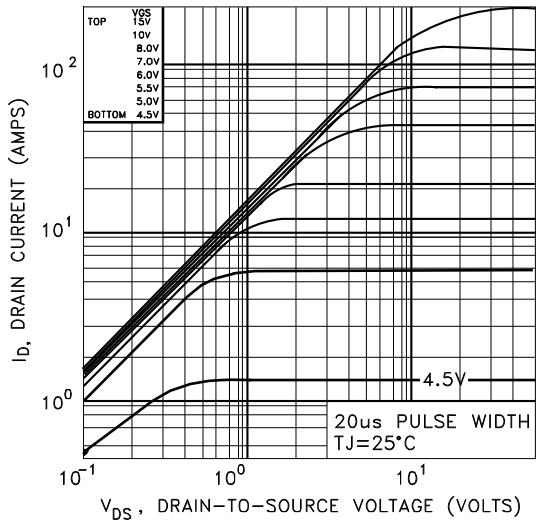


Figure 1

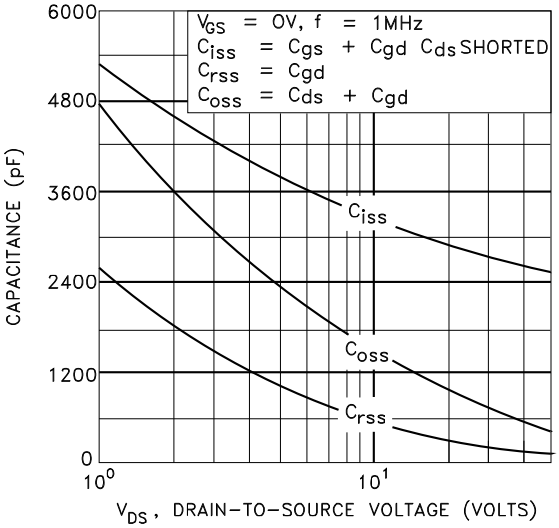
This deadtime should allow for the turn on and turn off time of the transistors, especially when slowing them down with gate resistors. This situation will be present when switching motor direction, or when sophisticated timing schemes are used for servo systems such as locked antiphase PWM'ing for high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

TYPICAL PERFORMANCE CURVES

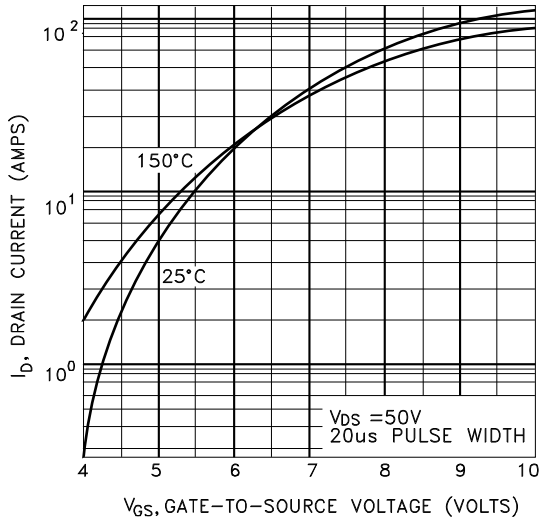
TYPICAL OUTPUT CHARACTERISTICS $T_C = 25°C$



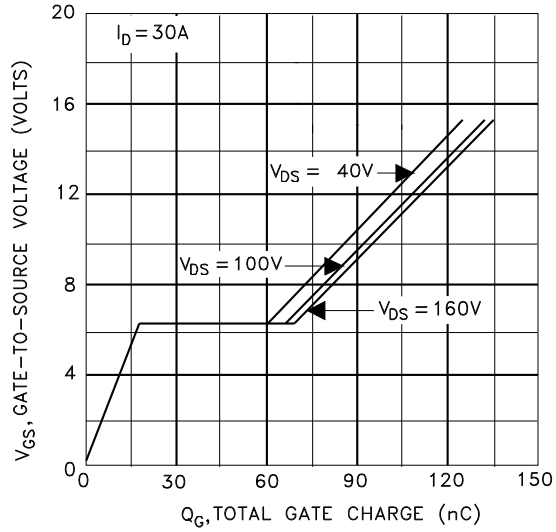
TYPICAL CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



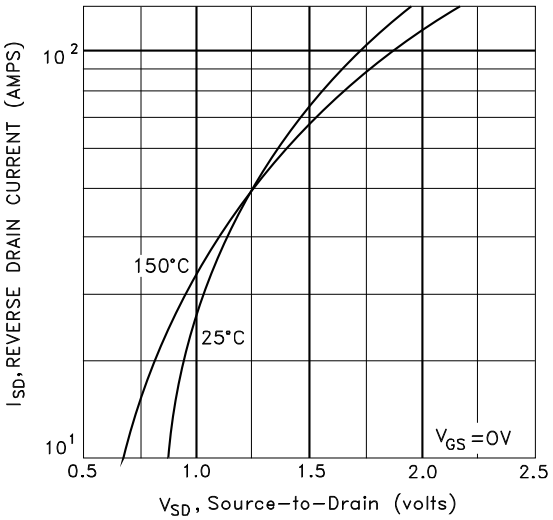
TYPICAL TRANSFER CHARACTERISTICS



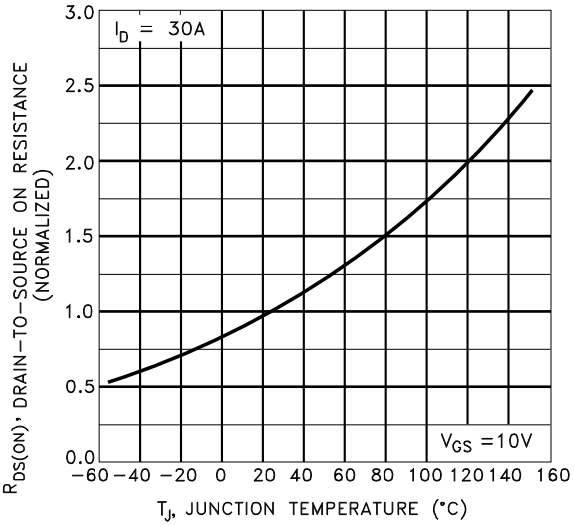
TYPICAL GATE CHARGE vs GATE TO SOURCE VOLTAGE (VOLTS)



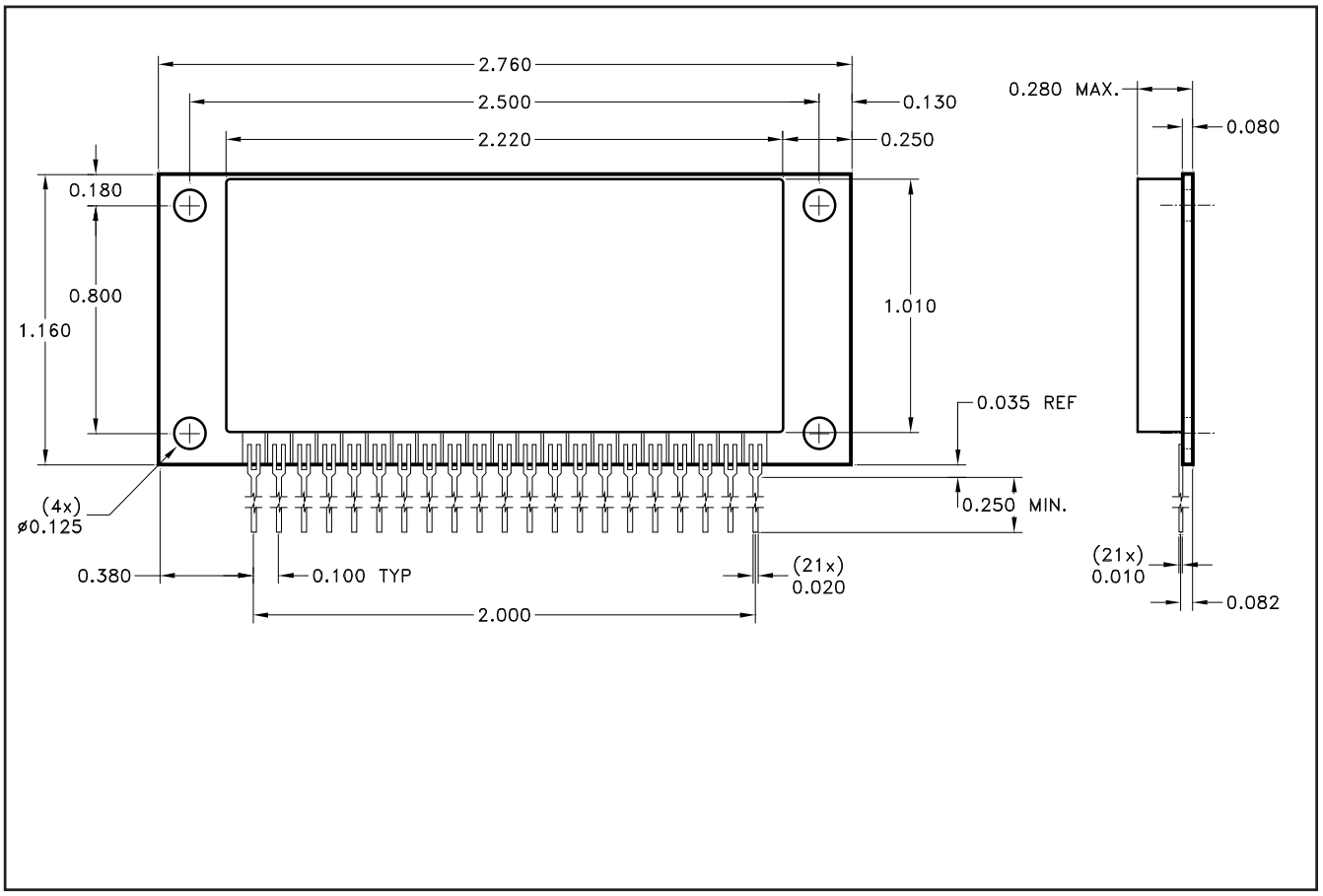
TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE



NORMALIZED ON-RESIGTANCE vs TEMPERATURE



MECHANICAL SPECIFICATIONS



ALL DIMENSIONS ARE ±0.010 INCHES UNLESS OTHERWISE LABELED.

ORDERING INFORMATION

Part Number	Screening Level
MSK 3016	Industrial

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