M.S.KENNEDY CORP.

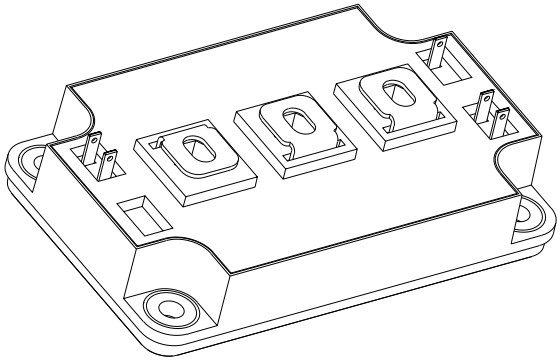
600V/450A HALF BRIDGE PEM 4800

4707 Dey Road Liverpool, N.Y. 13088 (315) 701-6751

FEATURES:

MIL-PRF-38534 CERTIFIED

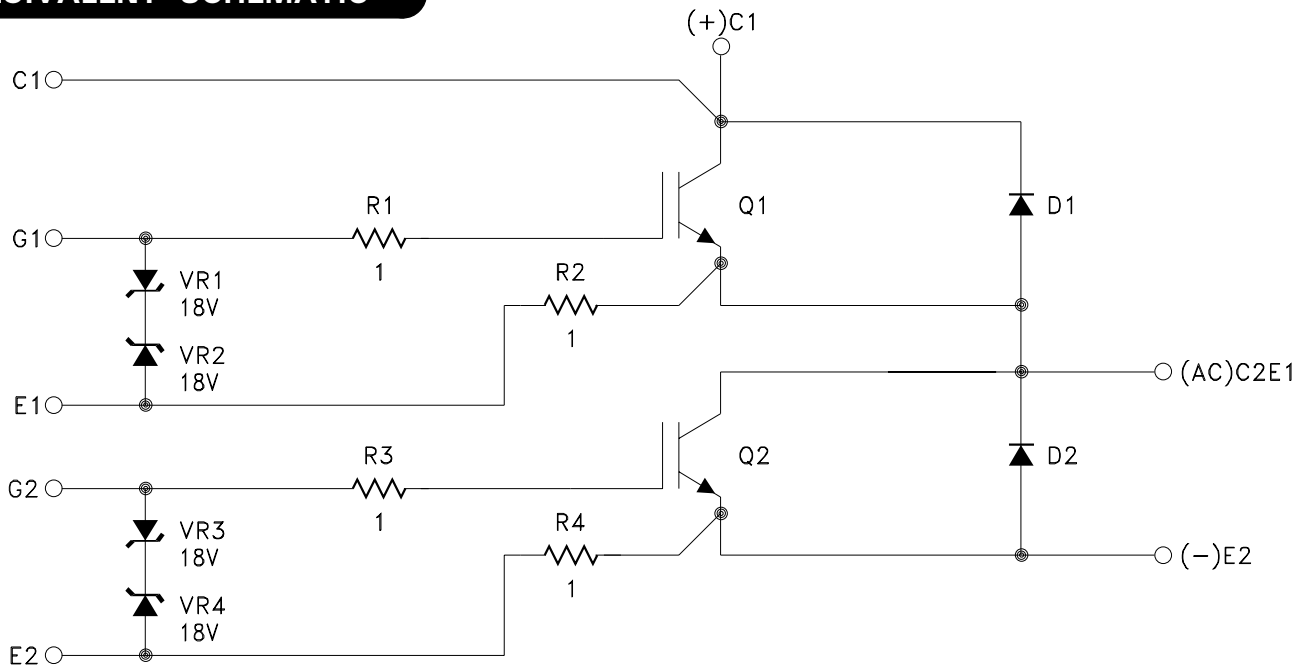
- Half Bridge Configuration
- 600V Rated Voltage
- 450A Continuous Output Current
- Internal Zener Clamps on Gates
- Proprietary Encapsulation Provides Near Hermetic Performance
- MIL-PRF-38534 Screening Available (Modified)
- Light Weight Domed ALSIC Baseplate
- Robust Mechanical Design for Hi-Rel Applications
- Ultra-Low Inductance Internal Layout
- Withstands 96 Hours HAST and Thermal Cycling (-55°C to +125°C)
- High Side Collector Sense Pin for De-Sat Detection



DESCRIPTION:

The MSK 4800 is one of a family of plastic encapsulated modules (PEM) developed specifically for use in military, aerospace and other severe environment applications. The half bridge configuration and 600 volt/450 amp rating make it ideal for use in high current motor drive and inverter applications. The Aluminum Silicon Carbide (AlSiC) baseplate offers superior flatness and light weight; far better than the copper or copper alloys found in most high power plastic modules. The high thermal conductivity materials used to construct the MSK 4800 allow high power outputs at elevated baseplate temperatures. Our proprietary coating, SEES™ - Severe Environment Encapsulation System - protects the internal circuitry of MSK PEM's from moisture and contamination, allowing them to pass the rugged environmental screening requirements of military and aerospace applications. MSK PEM's are also available with industry standard silicone gel coatings for a lower cost option.

EQUIVALENT SCHEMATIC



TYPICAL APPLICATIONS

- Motor Drives
- Inverters

ABSOLUTE MAXIMUM RATING ⑧

V_{CE}	Collector to Emitter Voltage 600V	T_{ST}	Storage Temperature Range . . . -55°C to +125°C
V_{GE}	Gate to Emitter Voltage . . . . . ±20V	T_J	Junction Temperature . . . . . 150°C
I_{OUT}	Current (Continuous) 450A	T_C	Case Operating Temperature Range
I_{OUTP}	Current Pulsed (1mS) 900A		MSK 4800H/E . . . . . -55°C to +125°C
V_{CASE}	Case Isolation Voltage . . . . . 2500 V		MSK 4800 . . . . . -40°C to +85°C

ELECTRICAL SPECIFICATIONS

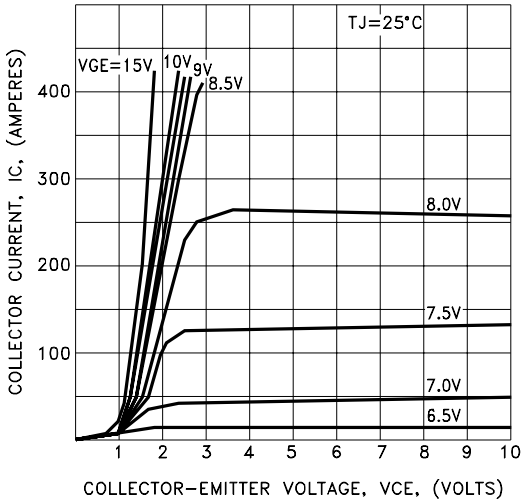
Parameter ⑥	Test Conditions	Group A Subgroup	MSK 4800 H/E Min.	MSK 4800 H/E Typ.	MSK 4800 H/E Max.	MSK 4800 Min.	MSK 4800 Typ.	MSK 4800 Max.	Units
Collector-Emitter Saturation Voltage	IC = 450A, VGE = 15V	1	-	1.9	2.6	-	1.9	2.7	V
		2	-	1.8	2.6	-	1.8	2.7	V
		3	-	2.1	2.8	-	2.1	2.9	V
Collector-Emitter Leakage Current	VCE = 600V, VGE = 0V	1	-	0.05	1.5	-	0.05	2.0	mA
		2	-	2.5	18	-	2.5	18	mA
		① 3	-	0.05	1.5	-	0.05	2.0	mA
Gate Threshold Voltage	IC = 45mA, VCE = VGE	1	4.0	5.3	7.5	4.0	5.3	7.5	V
		2	4.0	4.5	7.5	4.0	4.5	7.5	V
		3	4.0	6.0	7.5	4.0	6.0	7.5	V
Gate Leakage Current	VCE = 0V, VGE = ±15V	1	-10	0.2	10	-12	0.2	12	uA
		2	-10	0.4	10	-12	0.4	12	uA
		3	-10	0.1	10	-12	0.1	12	uA
Diode Forward Voltage	IC = 450A	1	-	1.5	2.6	-	1.5	2.7	V
		2	-	1.3	2.6	-	1.3	2.7	V
		3	-	1.6	2.8	-	1.6	2.9	V
Total Gate Charge ①	V = 300V, IC = 450A	4	-	2500	4300	-	2500	4300	nC
Turn-On Delay ①	V = 300V, IC = 450A, RG = 20Ω	4	-	790	900	-	790	900	nS
Rise Time ①	V = 300V, IC = 450A, RG = 20Ω	4	-	400	700	-	400	700	nS
Turn-Off Delay ①	V = 300V, IC = 450A, RG = 10Ω	4	-	1.5	2.1	-	1.5	2.1	uS
Fall Time ①	V = 300V, IC = 450A, RG = 10Ω	4	-	120	300	-	120	300	nS
Diode Reverse Recovery Time ①	IE = 450A, di/dt = 900A/uS	4	-	75	170	-	75	170	nS
Diode Reverse Recovery Charge ①	IE = 450A, di/dt = 900A/uS	4	-	1.6	2.5	-	1.6	2.5	uC
Thermal Resistance ①	IGBT @ TJ = 125°C	4	-	0.06	0.08	-	0.06	0.09	°C/W
	DIODE @ TJ = 125°C	4	-	0.1	0.15	-	0.1	0.16	°C/W

NOTES:

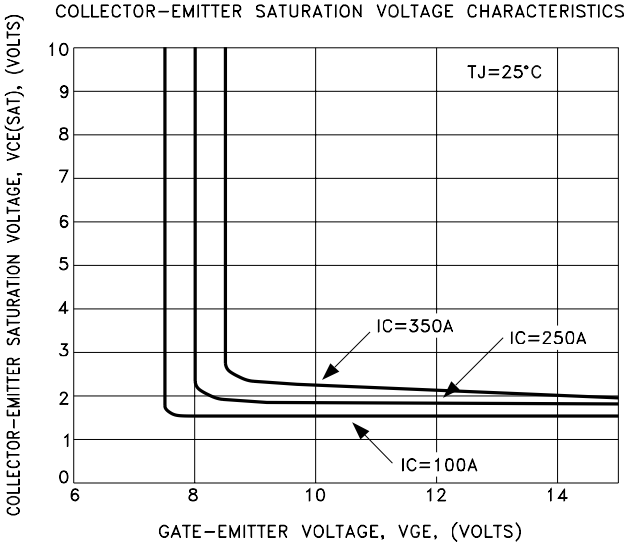
① Guaranteed by design but not tested. Typical parameters are representative of actual device performance but are for reference only.
② Industrial grade and "E" suffix devices shall be tested to subgroup 1 unless otherwise specified.
③ Military grade devices ("H" suffix) shall be 100% tested to subgroups 1, 2 and 3.
④ Subgroups 4, 5 and 6 testing available upon request.
⑤ Subgroup 1, 4 T_A = +25°C
2, 5 T_A = +125°C
3, 6 T_A = -55°C
⑥ All specifications apply to both the upper and lower sections of the half bridge.
⑦ V_{GE} = 15V unless otherwise specified.
⑧ Continuous operation at or above absolute maximum ratings may adversly effect the device performance and/or life cycle

TYPICAL PERFORMANCE CURVES

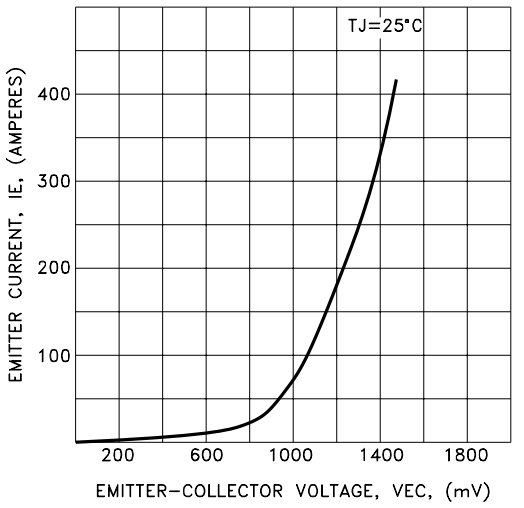
TYPICAL OUTPUT CHARACTERISTICS



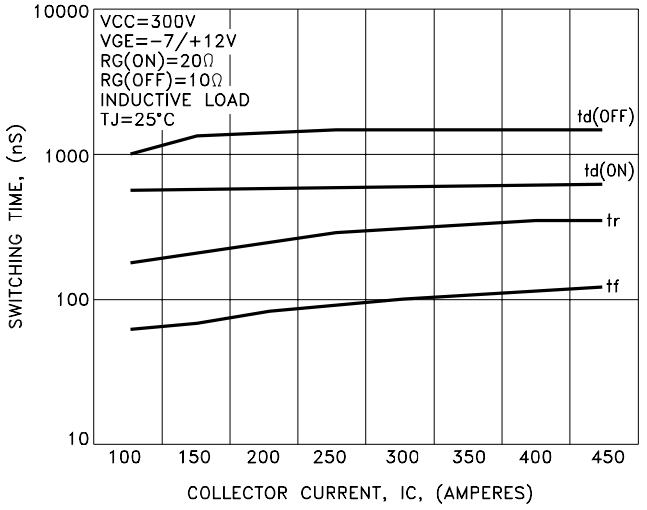
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS



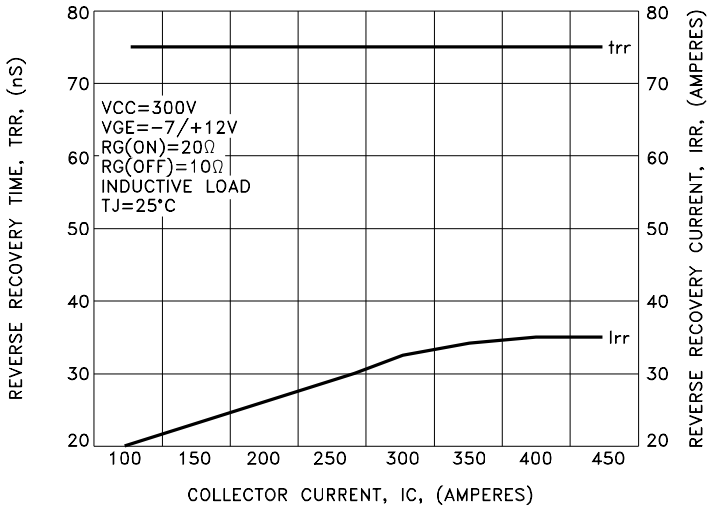
FREE-WHEEL DIODE FORWARD CHARACTERISTICS



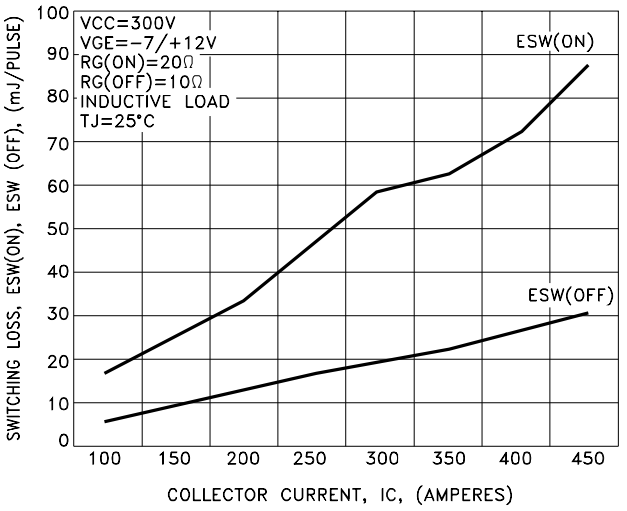
SWITCHING CHARACTERISTICS



REVERSE RECOVERY CHARACTERISTICS



SWITCHING LOSS vs. COLLECTOR CURRENT

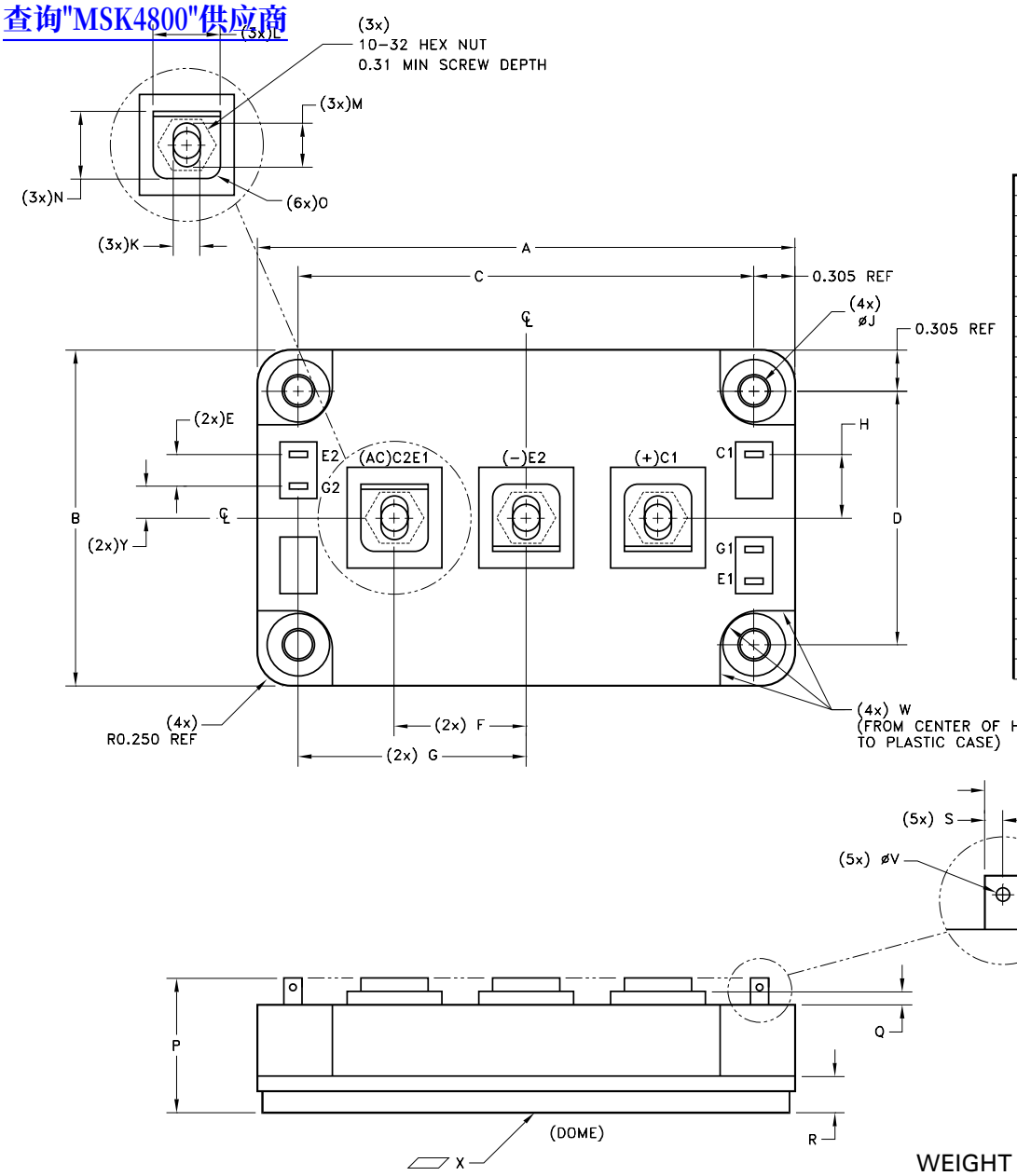


SCREENING CHART

OPERATION IN ACCORDANCE WITH MIL-PRF-38534	INDUSTRIAL	CLASS E	CLASS H
QUALIFICATION (MODIFIED)	NO	NO	YES
ELEMENT EVALUATION	NO	YES	YES
CLEAN ROOM PROCESSING	YES	YES	YES
NON DESTRUCT BOND PULL SAMPLE	YES	YES	YES
CERTIFIED OPERATORS	NO	YES	YES
MIL LINE PROCESSING	YES	YES	YES
MAX REWORK SPECIFIED	NO	YES	YES
ENCAPSULANT	GEL COAT	SEES™	SEES™
PRE-CAP VISUAL	YES - INDUSTRIAL	YES - CLASS H	YES - CLASS H
TEMP CYCLE (-55°C TO +125°C)	NO	YES	YES
BURN-IN	NO	YES - 96 HOURS	YES - 160 HOURS
ELECTRICAL TESTING	YES - 25°C	YES - 25°C	YES - FULL TEMP
EXTERNAL VISUAL	YES - SAMPLE	YES - SAMPLE	YES
XRAY	NO	NO	NO
PIN FINISH	NI	NI	NI

NOTE: ADDITIONAL SCREENING IS AVAILABLE SUCH AS XRAY, CSAM, MECHANICAL SHOCK, ETC. CONTACT FACTORY FOR QUAL STATUS.

MECHANICAL SPECIFICATIONS



REF	MIN	MAX
A	3.970	4.020
B	2.470	2.510
C	3.385	3.395
D	1.885	1.895
E	0.186	0.286
F	0.970	0.990
G	1.645	1.745
H	0.422	0.522
J	0.208	0.225
K	0.195	0.205
L	0.500	0.550
M	0.310	0.340
N	0.500	0.700
O*	0.100	———
P	0.985	1.015
Q	0.090	———
R	0.255	0.285
S	0.048	0.068
T	0.105	0.125
U	0.060	0.080
V	0.040	0.060
W	0.240	———
X	0.000	0.008
Y	0.186	0.286

WEIGHT = 272 GRAMS MAX.

ORDERING INFORMATION

MSK4800 H

SCREENING
BLANK = INDUSTRIAL; E = EXTENDED RELIABILITY;
H = MIL-PRF-38534 CLASS H (MODIFIED)

GENERAL PART NUMBER

THE ABOVE EXAMPLE IS A MILITARY SCREENED MODULE.

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