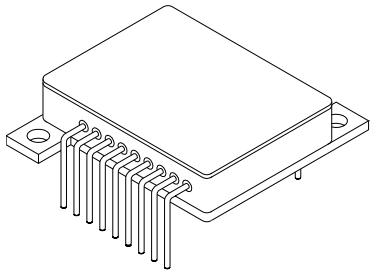
MIL-PRF-38534 & 38535 CERTIFIED FACILITY

HIGH TEMPERATURE 600V/10A HERMETIC HALF BRIDGE

4105

FEATURES:

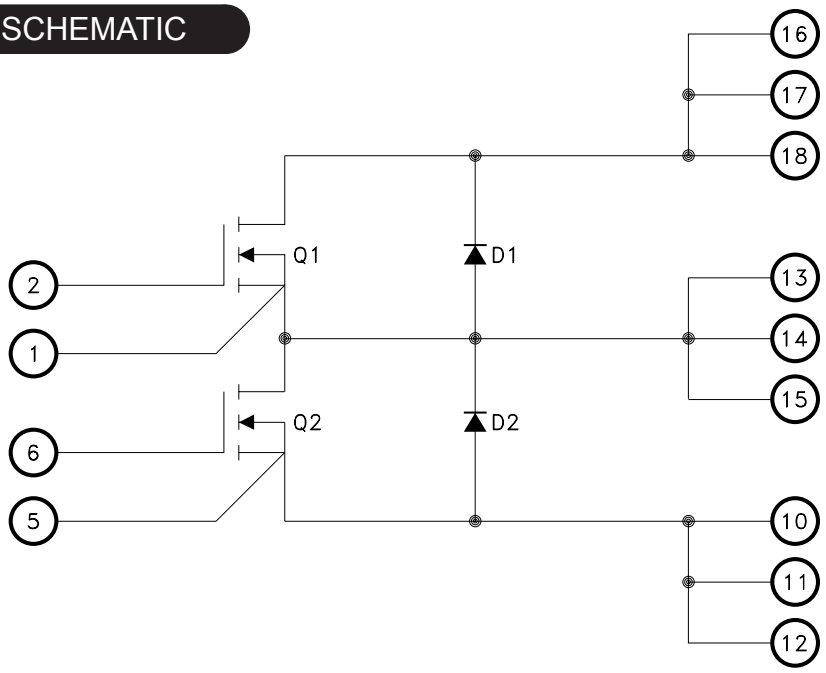
- Operational From -55°C to 190°C
- Half Bridge Configuration
- Silicon Carbide Power MOSFETS
- Silicon Carbide Recovery Diodes
- 600V Rated Voltage
- 20A Continuous Output Current at Tc=25°C
- 10A Continuous Output Current at Tc=190°C
- Available in Three Lead Bend Configurations
- Package Isolated for High Voltage Isolation
- Contact MSK for MIL-PRF-38534 Qualification Status



DESCRIPTION:

The MSK4105 is a hermetic high temperature half bridge configuration SiC (Silicon Carbide) power MOSFET design with parallel SiC recovery diodes. The hermetic design makes it ideal for use in oil/gas/down-hole, aerospace and other extreme environment applications. The MSK4105 is capable of 10 amps of continuous output current at Tc=190°C. The 600V rating makes the MSK4105 ideal for high bus voltage applications. The package is electrically isolated which allows direct heat sinking and provides good thermal conductivity. The package is a space efficient 18 pin power package with three lead form configurations option available.

EQUIVALENT SCHEMATIC



TYPICAL APPLICATIONS

- Aeronautics & Aerospace
- Down-Hole
- Extreme Environments

PIN-OUT INFORMATION

1	G1 RTN	10	S2
2	G1	11	S2
3	NC	12	S2
4	NC	13	S1/D2
5	G2 RTN	14	S1/D2
6	G2	15	S1/D2
7	NC	16	D1
8	NC	17	D1
9	NC	18	D1

ABSOLUTE MAXIMUM RATING ⑧

V_{DS}	Drain to Source Voltage.....600V	T_{ST}	Storage Temperature Range.....-55°C to +200°C
V_{GS}	Gate to Source Voltage.....+25/-10V	T_J	Junction Temperature.....210°C
I_{OUT}	Current (Continuous) Tc=25°C.....20A	T_C	Case Operating Temperature Range
I_{OUT}	Current (Continuous) Tc=190°C.....10A		MSK4105H.....-55°C to +190°C
I_{OUTP}	Current Pulsed (1mS) Tc=190°C.....20A		MSK4105.....-40°C to +190°C

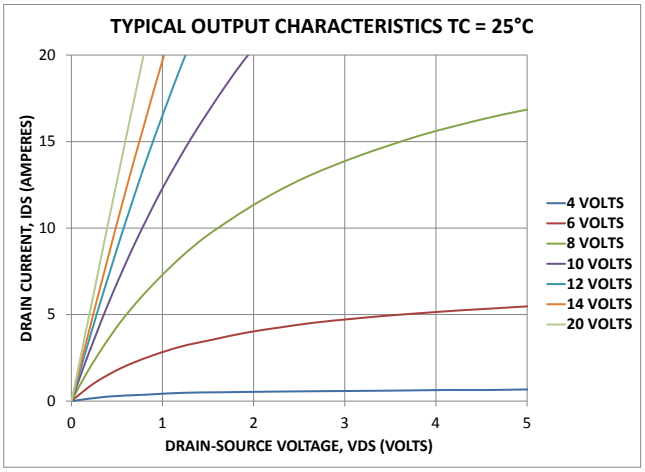
ELECTRICAL SPECIFICATIONS

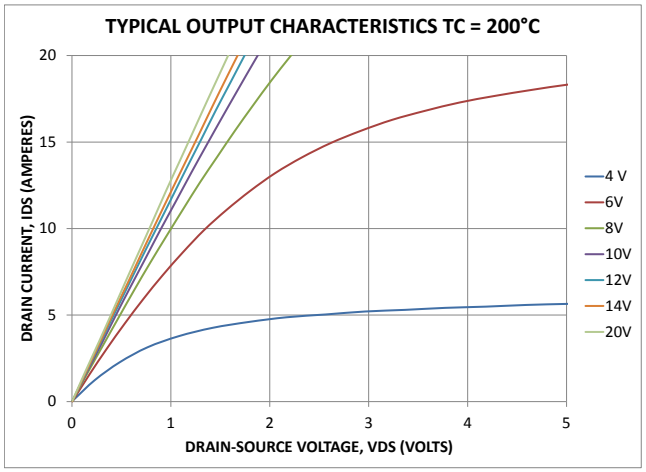
Parameter ⑥	Test Conditions	Group A Subgroup	MSK4105H Min.	MSK4105H Typ.	MSK4105H Max.	MSK4105 Min.	MSK4105 Typ.	MSK4105 Max.	Units
Drain−Source Voltage	I_D=10A, V_{GS}=20V	1	–	0.42	0.62	–	0.42	0.62	V
		2	–	0.82	1.00	–	–	–	V
		3	–	0.39	0.60	–	–	–	V
Drain−Source Leakage Current	V_{DS}=600V, V_{GS}=0V	1	–	1.3	20.00	–	1.3	20.00	uA
		2	–	4.0	30.00	–	–	–	uA
Gate Threshold Voltage	I_D=10mA, V_{DS}=10V	1	1.00	2.00	2.70	1.00	2.00	2.70	V
		2	0.08	1.40	2.00	–	–	–	V
Diode Forward Voltage	I_D=10A	1	–	1.60	1.80	–	1.60	1.80	V
		2	–	1.82	2.00	–	–	–	V
		3	–	1.51	1.75	–	–	–	V
Total Gate Charge ①	V=300V, I_D=10A	4	–	179	TBD	–	179	TBD	nC
E(on) ①	V=300V, I_D=10A, RG=5Ω , V_{GS}=−5/+20V	4	–	TBD	TBD	–	TBD	TBD	mJ
E(off) ①	V=300V, I_D=10A, RG=5Ω , V_{GS}=−5/+20V	4	–	TBD	TBD	–	TBD	TBD	mJ
Diode Reverse Recovery Time ①	I_S=10, di/dt=TBDA/uS	4	–	TBD	–	–	TBD	–	nS
Thermal Resistance ①	MOSFET @ T_J=210°C	–	–	1.5	1.7	–	1.5	1.7	°C/W
	DIODE @ T_J=210°C	–	–	1.7	1.9	–	1.7	1.9	°C/W

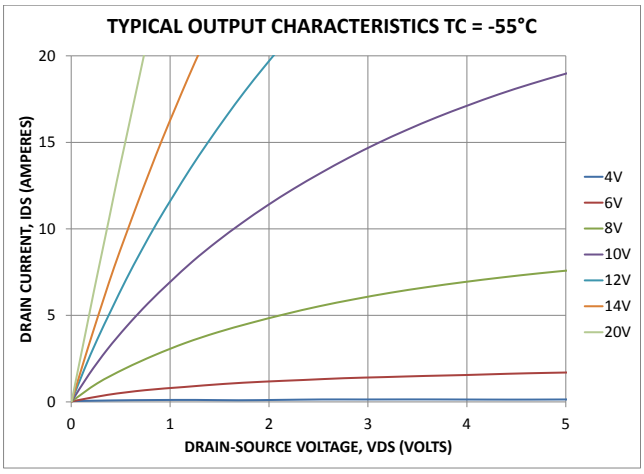
NOTES:

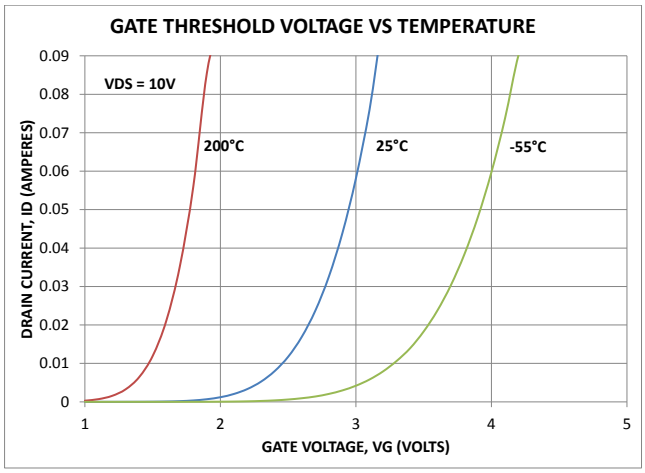
① Guaranteed by design but not tested. Typical parameters are representative of actual device performance but are for reference only.
② Industrial grade devices shall be tested to subgroup 1 unless otherwise specified.
③ Class H ("H" suffix) shall be 100% tested to subgroups 1, 2 and sample tested to subgroup 3.
④ Subgroup 4 testing available upon request.
⑤ Subgroup 1, 4 T_A = +25°C
2 T_C = +190°C
3 T_C = -55°C
⑥ All specifications apply to both the upper and lower sections of the half bridge.
⑦ V_{GS}=20V unless otherwise specified.
⑧ Continuous operation at or above absolute maximum ratings may adversly effect the device performance and/or life cycle.

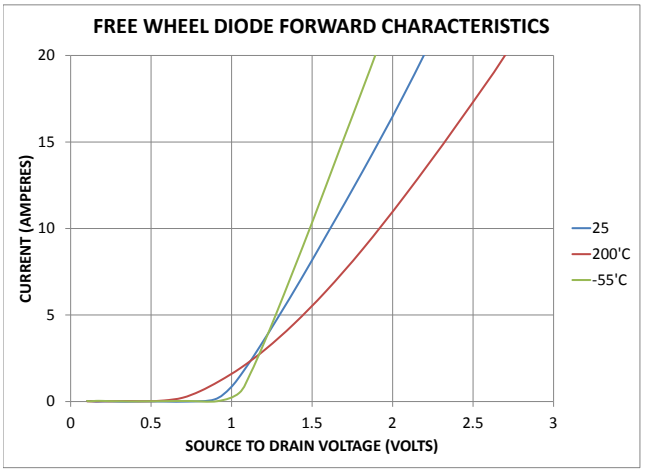
TYPICAL PERFORMANCE CURVES

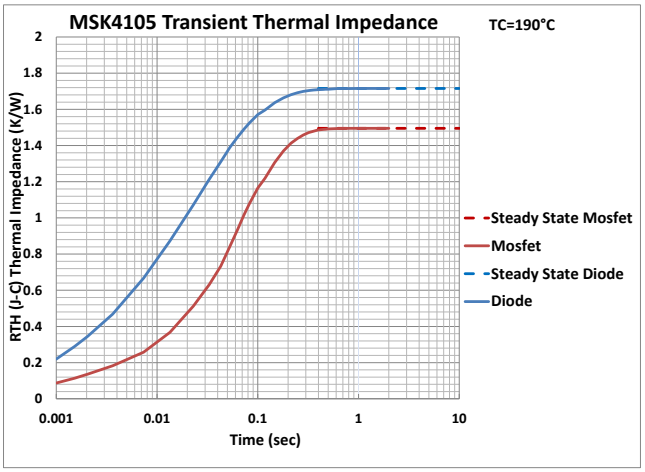




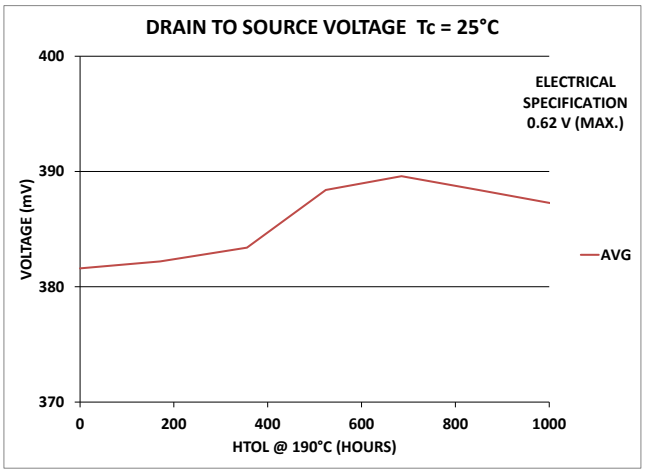


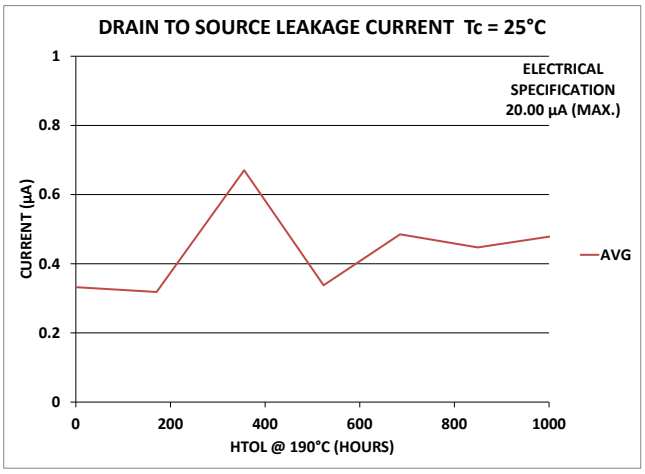


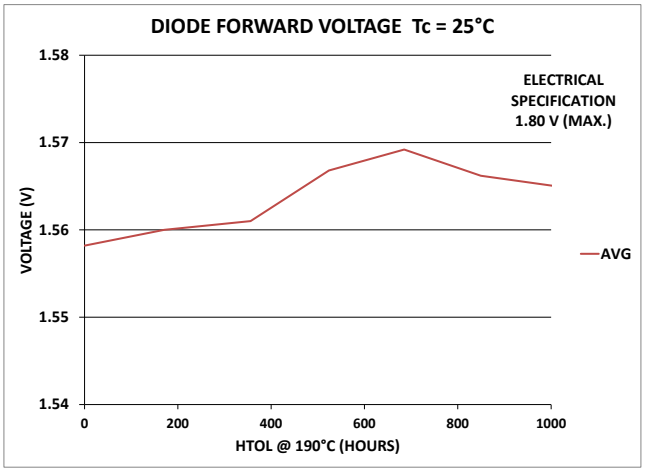


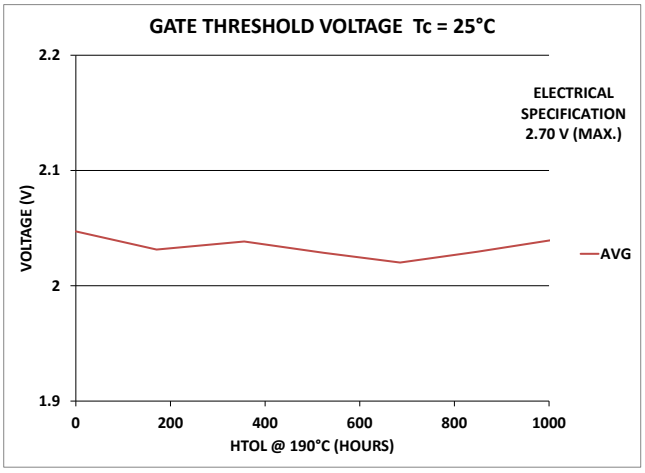


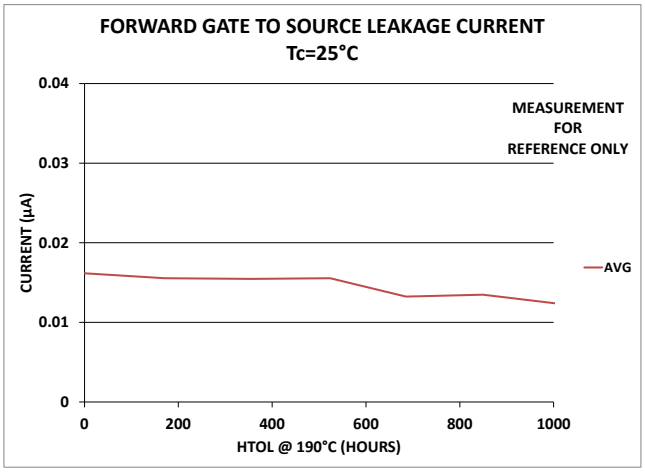
HIGH TEMP. OPERATING LIFE PERFORMANCE CURVES

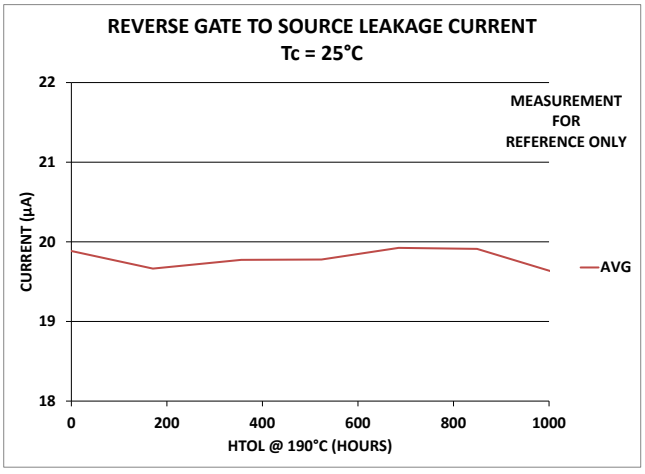




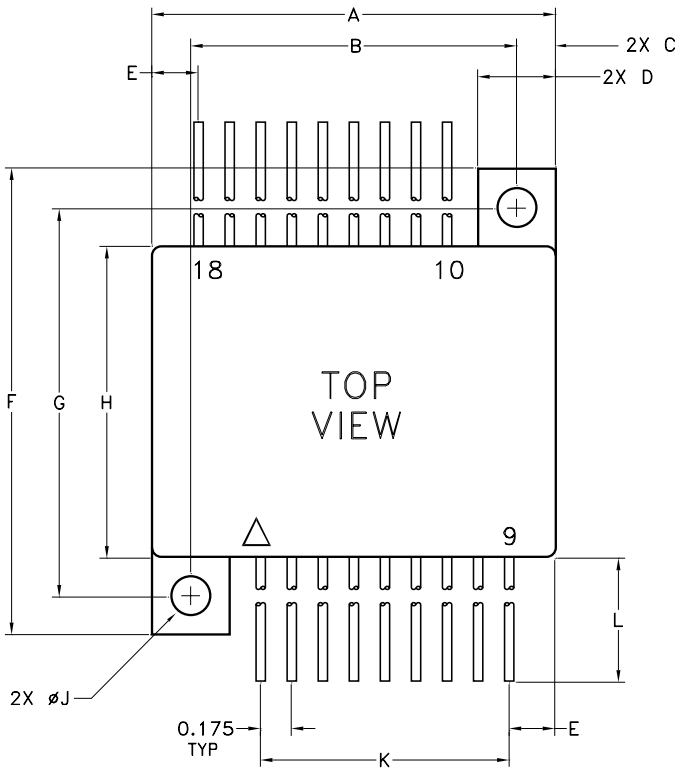


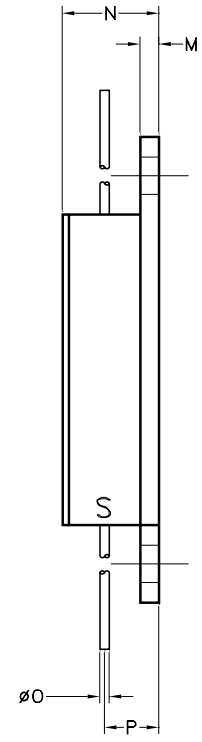




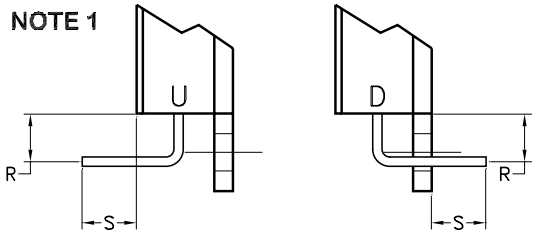


MECHANICAL SPECIFICATIONS





REF	MIN	MAX
A	1.290	1.310
B	1.040	1.060
C	0.120	0.130
D	0.240	0.260
E	0.140	0.160
F	1.490	1.510
G	1.240	1.260
H	0.990	1.010
J	0.120	0.130
K	0.795	0.805
L	0.500	———
M	0.055	0.065
N	———	0.310
O	0.027	0.033
P	0.165	0.185
R	0.143	0.163
S	0.175	———



ESD TRIANGLE INDICATES PIN 1
WEIGHT=24.6 GRAMS TYPICAL

ALL DIMENSIONS ARE SPECIFIED IN INCHES

ORDERING INFORMATION

MSK4105 H U

LEAD CONFIGURATIONS
S= STRAIGHT; U= BENT UP; D= BENT DOWN

SCREENING
BLANK= INDUSTRIAL; H= MIL-PRF-38534, CLASS H

GENERAL PART NUMBER

The above example is a Class H screened module with leads bent up.

REVISION HISTORY

REV	STATUS	DATE	DESCRIPTION
-	Preliminary	02/14	Initial Release
A	Released	07/14	Update Electrical Specification Table and Assign Form Number
B	Released	02/15	Add life test typical performance curves

MSK
www.anaren.com/msk