

## Phase leg MOSFET Power Module

$$V_{DSS} = 500V$$

$$R_{DSon} = 25m\Omega \text{ max @ } T_j = 25^\circ C$$

$$I_D = 149A \text{ @ } T_c = 25^\circ C$$

### Application

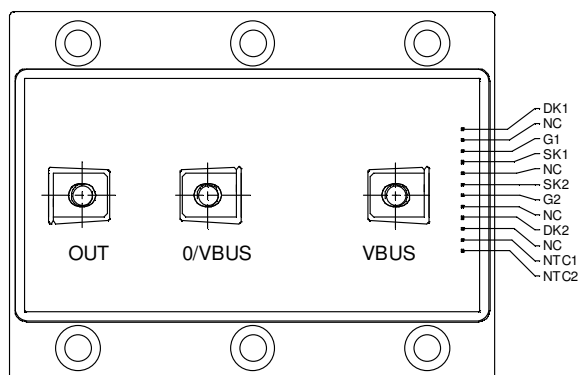
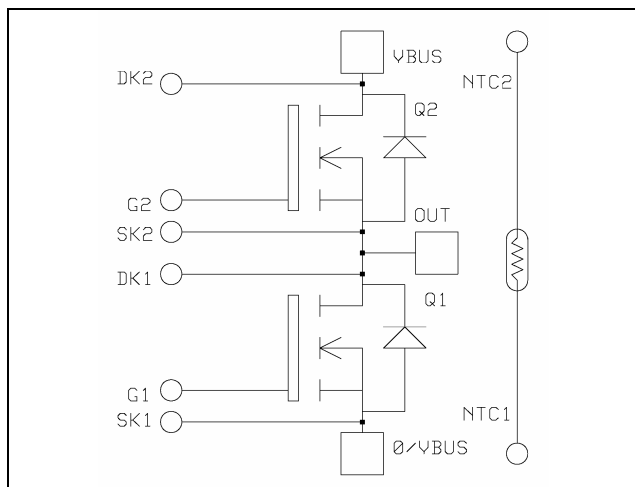
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

### Features

- Power MOS V<sup>®</sup> FREDFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic diode
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Kelvin Drain for VDS monitoring
- Very low stray inductance
  - Symmetrical design
  - M5 power connectors
- Internal thermistor for temperature monitoring
- High level of integration

### Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals for signal and M5 for power for easy PCB mounting



### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	500	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
$I_{DM}$	Pulsed Drain current	450	
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	25	m $\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	W
$I_{AR}$	Avalanche current (repetitive and non repetitive)	149	A
$E_{AR}$	Repetitive Avalanche Energy	30	mJ
$E_{AS}$	Single Pulse Avalanche Energy	1300	

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

## Electrical Characteristics

All ratings @  $T_j = 25^\circ\text{C}$  unless otherwise specified

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$BV_{DSS}$	Drain - Source Breakdown Voltage	$V_{GS} = 0V, I_D = 1mA$	500			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 500V, T_j = 25^\circ\text{C}$			1000	$\mu A$
		$V_{GS} = 0V, V_{DS} = 400V, T_j = 125^\circ\text{C}$			2500	
$R_{DS(on)}$	Drain - Source on Resistance	$V_{GS} = 10V, I_D = 74.5A$			25	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 8mA$	2		4	V
$I_{GSS}$	Gate - Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 250$	nA

## Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		29.6		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		4.1		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1MHz$		1.6		
$Q_g$	Total gate Charge	$V_{GS} = 10V$		1200		nC
$Q_{gs}$	Gate - Source Charge	$V_{Bus} = 250V$		200		
$Q_{gd}$	Gate - Drain Charge	$I_D = 149A$		560		
$T_{d(on)}$	Turn-on Delay Time	<b>Resistive Switching</b> $V_{GS} = 15V$ $V_{Bus} = 250V$ $I_D = 149A$ $R_G = 0.22 \Omega$		15		ns
$T_r$	Rise Time			20		
$T_{d(off)}$	Turn-off Delay Time			50		
$T_f$	Fall Time			10		

## Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_S$	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			149	A
		$T_c = 80^\circ\text{C}$			111	
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0V, I_S = -149A$			1.3	V
$dv/dt$	Peak Diode Recovery ❶				5	V/ns
$t_{rr}$	Reverse Recovery Time	$I_S = -149A$ $V_R = 250V$ $di/dt = 800A/\mu s$	$T_j = 25^\circ\text{C}$		250	ns
			$T_j = 125^\circ\text{C}$		500	
$Q_{rr}$	Reverse Recovery Charge	$I_S = -149A$ $V_R = 250V$ $di/dt = 800A/\mu s$	$T_j = 25^\circ\text{C}$	10.4		$\mu C$
			$T_j = 125^\circ\text{C}$	36		

❶  $dv/dt$  numbers reflect the limitations of the circuit rather than the device itself.

$I_S \leq -149A$      $di/dt \leq 700A/\mu s$      $V_R \leq V_{DSS}$      $T_j \leq 150^\circ\text{C}$

## Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{thJC}$	Junction to Case			0.1	°C/W
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t = 1 \text{ min}$ , $I_{isol} < 1 \text{ mA}$ , 50/60Hz	2500			V
$T_J$	Operating junction temperature range	-40		150	°C
$T_{STG}$	Storage Temperature Range	-40		125	
$T_C$	Operating Case Temperature	-40		100	
Torque	Mounting torque	To heatsink	M5	2	N.m
		For terminals	M5	2	
Wt	Package Weight			550	g

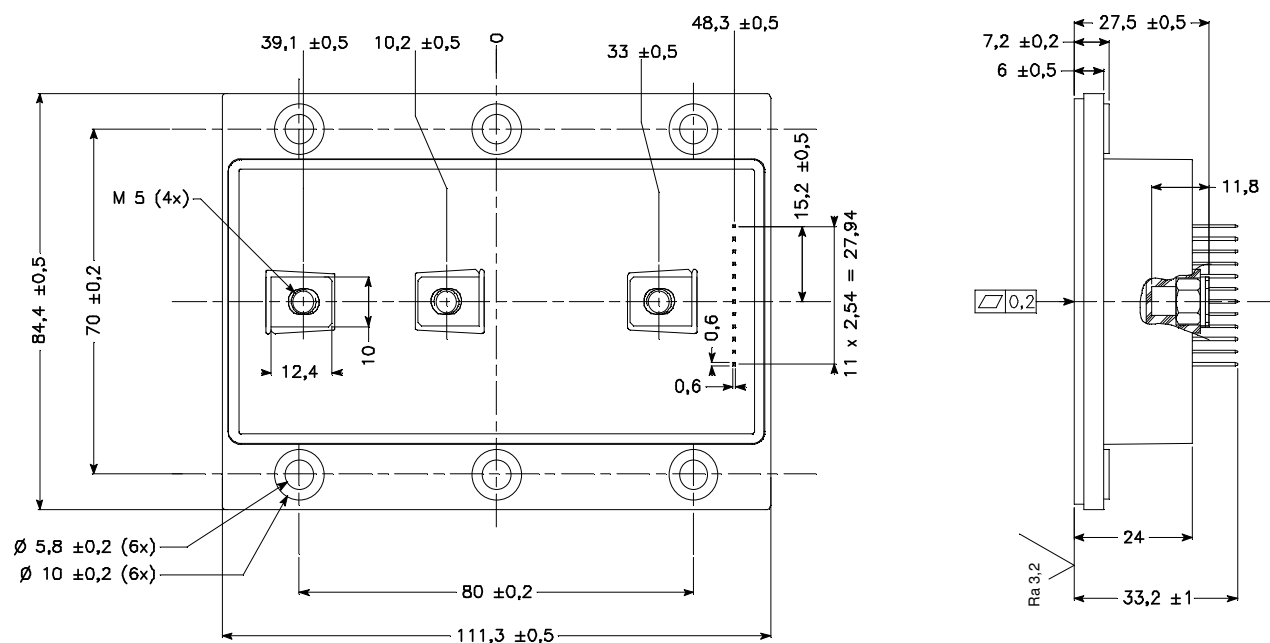
## Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{25}$	Resistance @ 25°C		68		kΩ
$B_{25/85}$	$T_{25} = 298.16 \text{ K}$		4080		K

$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

## Package outline



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