

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

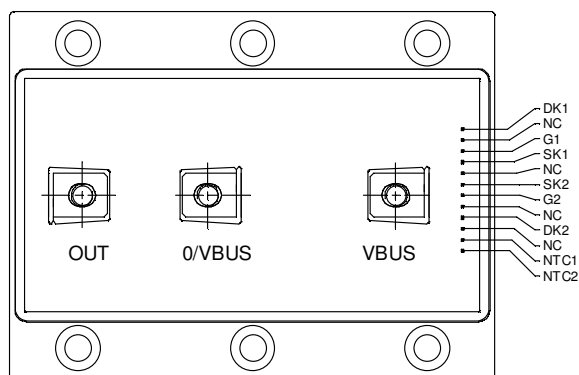
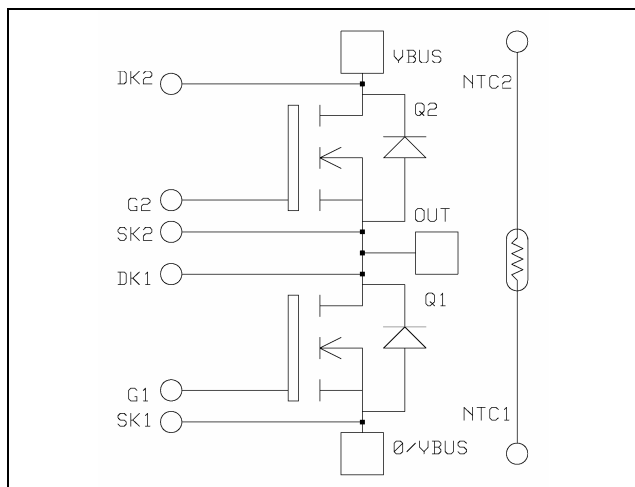
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- Power MOS V[®] 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	$T_c = 25^\circ C$ 149	A
		$T_c = 80^\circ C$ 111	
I_{DM}	Pulsed Drain current	450	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	25	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$ 1250	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	μA
		$V_{GS} = 0V, V_{DS} = 400V, T_j = 125^\circ\text{C}$			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	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 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	Resistive Switching $V_{GS} = 15V$ $V_{Bus} = 250V$ $I_D = 149A$ $R_G = 0.22 \Omega$		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		μC
			$T_j = 125^\circ\text{C}$	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

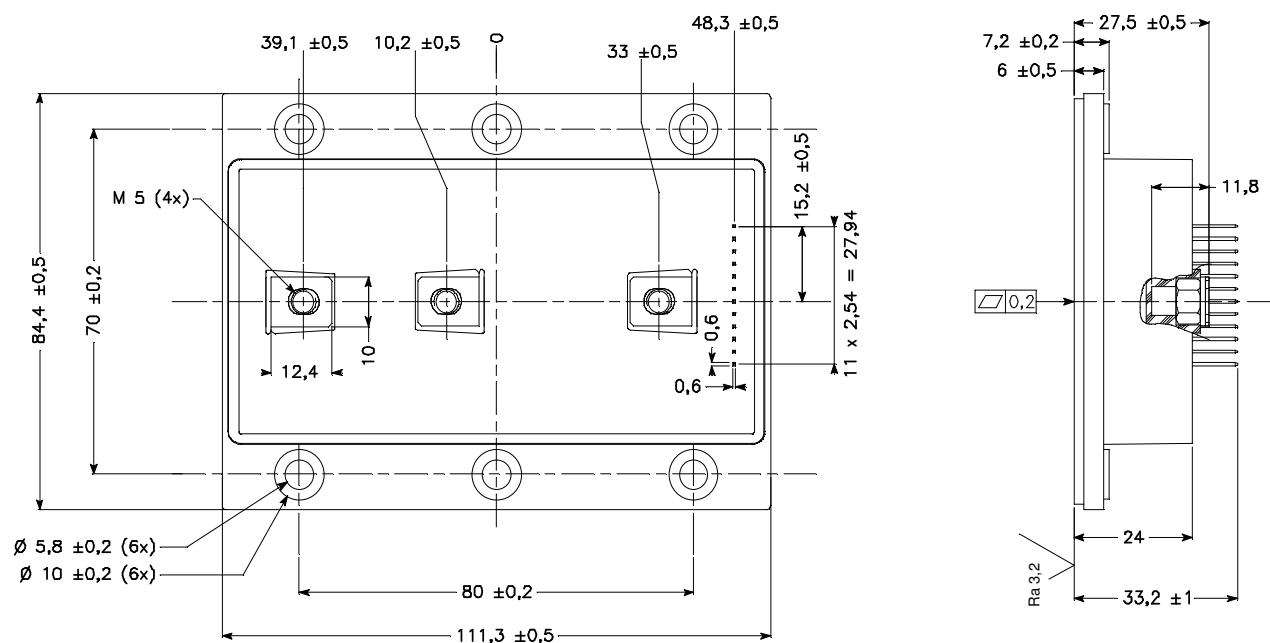
Temperature sensor NTC

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_T: Thermistor value at T

Package outline



APT reserves the right to change, without notice, the specifications and information contained herein

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