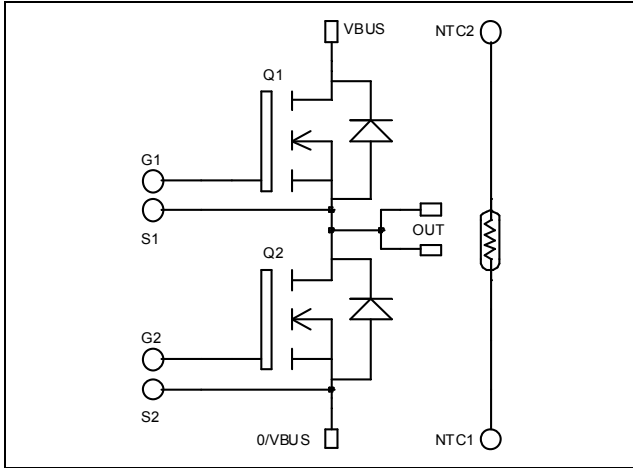


*Phase leg  
MOSFET Power Module*

**$V_{DSS} = 500V$   
 $R_{DSon} = 35m\Omega \text{ max @ } T_j = 25^\circ C$   
 $I_D = 99A \text{ @ } T_c = 25^\circ C$**

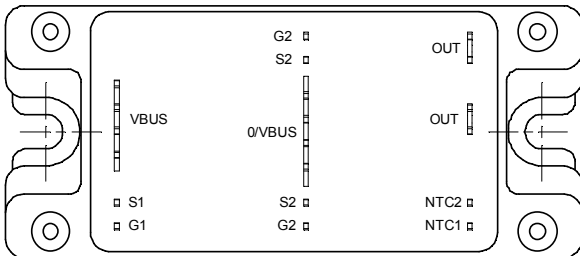


**Application**

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

**Features**

- Power MOS 7<sup>®</sup> FREDFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic reverse diode
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
  - Symmetrical design
  - Lead frames for power connections
- 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 both for power and signal for easy PCB mounting
- Low profile

**Absolute maximum ratings**

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	500	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	99
		$T_c = 80^\circ C$	74
$I_{DM}$	Pulsed Drain current	396	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	35	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	781
$I_{AR}$	Avalanche current (repetitive and non repetitive)	51	A
$E_{AR}$	Repetitive Avalanche Energy	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy	3000	

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

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

## Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$BV_{DSS}$	Drain - Source Breakdown Voltage	$V_{GS} = 0V, I_D = 375\mu A$	500			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 500V, T_j = 25^\circ\text{C}$			375	$\mu A$
		$V_{GS} = 0V, V_{DS} = 400V, T_j = 125^\circ\text{C}$			1500	
$R_{DS(on)}$	Drain - Source on Resistance	$V_{GS} = 10V, I_D = 49.5A$			35	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 5mA$	3		5	V
$I_{GSS}$	Gate - Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 150$	nA

## Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$		14		nF
$C_{oss}$	Output Capacitance			2.8		
$C_{rss}$	Reverse Transfer Capacitance			0.2		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 250V$ $I_D = 99A$		280		nC
$Q_{gs}$	Gate - Source Charge			80		
$Q_{gd}$	Gate - Drain Charge			140		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V$ $V_{Bus} = 333V$ $I_D = 99A$ $R_G = 1\Omega$		21		ns
$T_r$	Rise Time			38		
$T_{d(off)}$	Turn-off Delay Time			75		
$T_f$	Fall Time			93		
$E_{on}$	Turn-on Switching Energy ❶	<b>Inductive switching @ 25°C</b> $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 99A, R_G = 1\Omega$		2070		$\mu J$
$E_{off}$	Turn-off Switching Energy ❷			1690		
$E_{on}$	Turn-on Switching Energy ❶	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 99A, R_G = 1\Omega$		3112		$\mu J$
$E_{off}$	Turn-off Switching Energy ❷			2026		

## Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$I_S$	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			99	A	
		$T_c = 80^\circ\text{C}$			74		
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0V, I_S = -99A$			1.3	V	
dv/dt	Peak Diode Recovery ❸				15	V/ns	
$t_{rr}$	Reverse Recovery Time	$I_S = -99A$ $V_R = 250V$ $di_S/dt = 200A/\mu s$	$T_j = 25^\circ\text{C}$			270	ns
			$T_j = 125^\circ\text{C}$			540	
$Q_{rr}$	Reverse Recovery Charge	$I_S = -99A$ $V_R = 250V$ $di_S/dt = 200A/\mu s$	$T_j = 25^\circ\text{C}$		5.2	$\mu C$	
			$T_j = 125^\circ\text{C}$		19.2		

❶  $E_{on}$  includes diode reverse recovery.

❷ In accordance with JEDEC standard JESD24-1.

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

$$I_S \leq -99A \quad di/dt \leq 700A/\mu s \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

## Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case			0.16	°C/W	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, I isol<1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque		To Heatsink	M5	4.7	N.m
Wt	Package Weight			160	g	

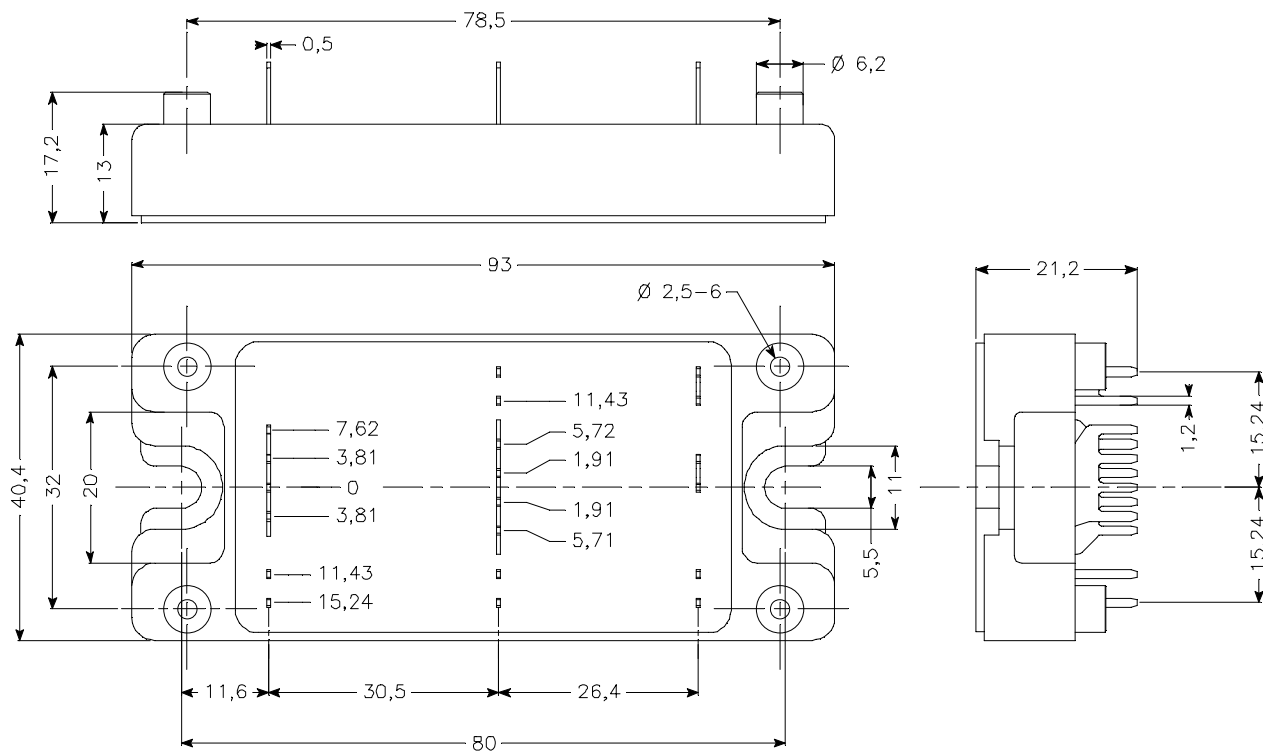
## Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		68		kΩ
B <sub>25/85</sub>	T <sub>25</sub> = 298.16 K		4080		K

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

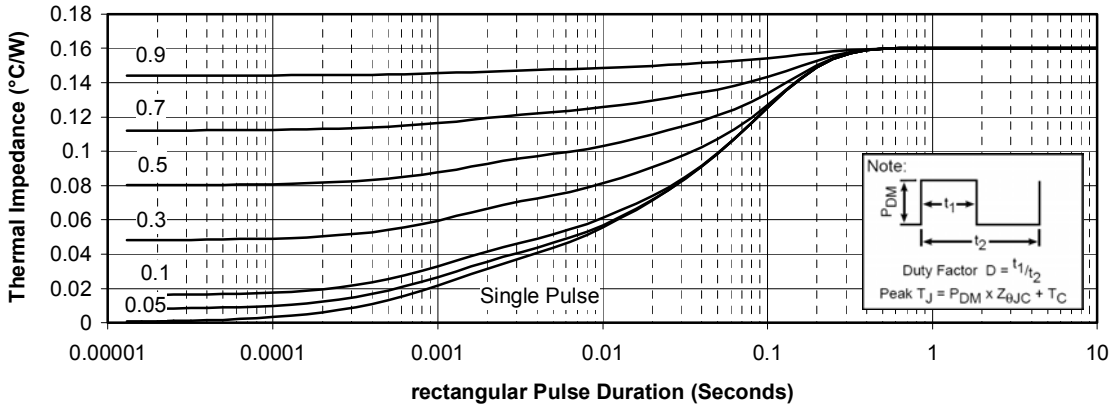
T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

## Package outline

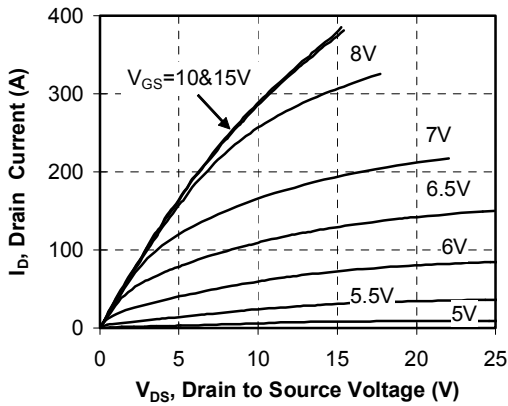


**Typical Performance Curve**

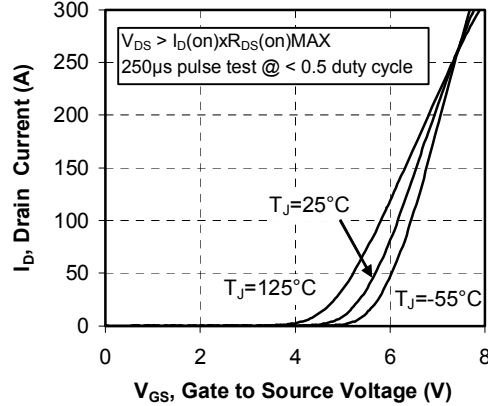
**Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration**



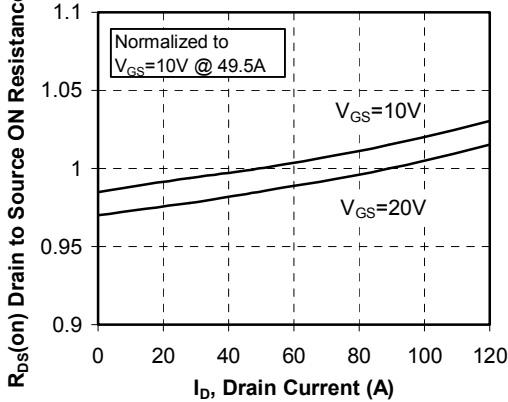
**Low Voltage Output Characteristics**



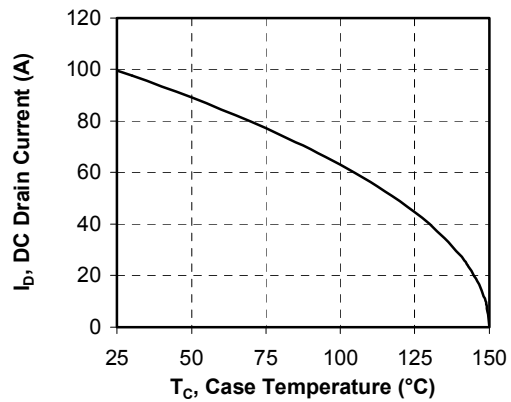
**Transfer Characteristics**

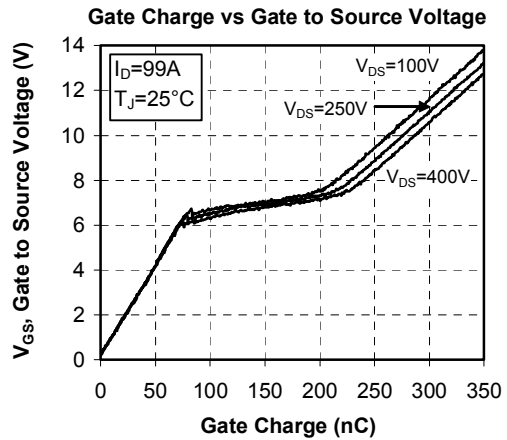
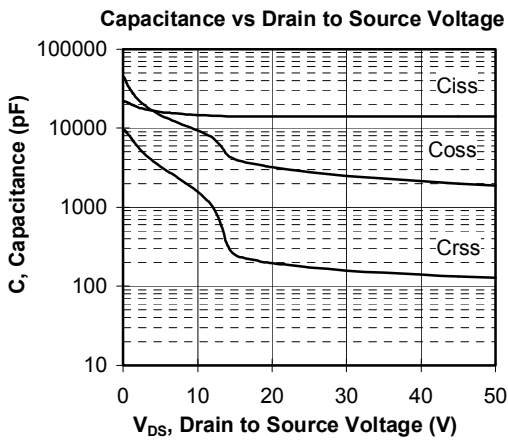
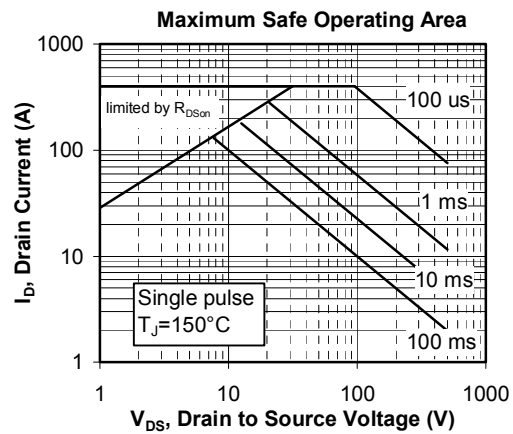
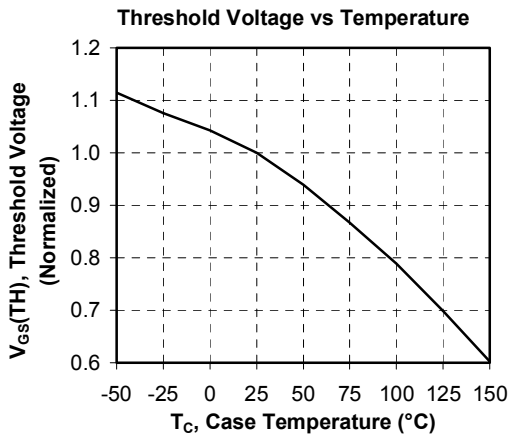
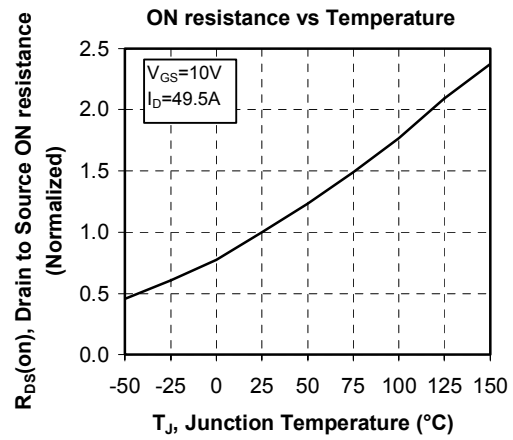
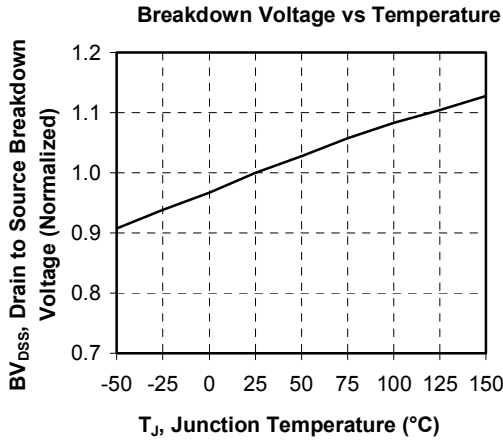


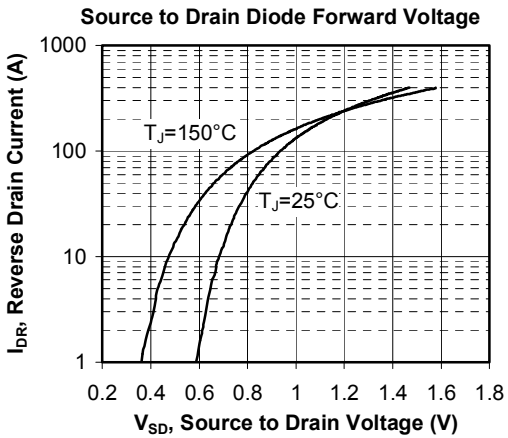
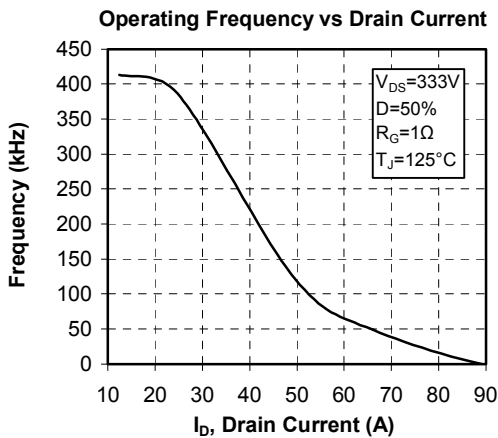
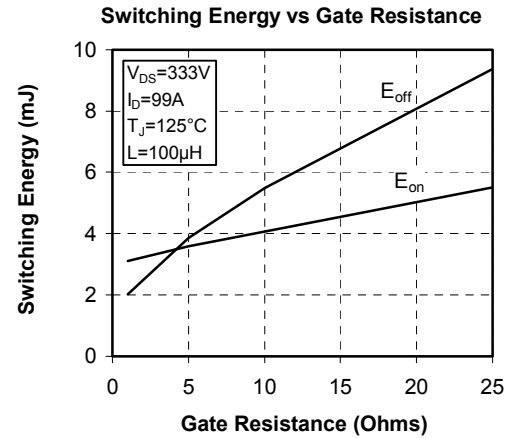
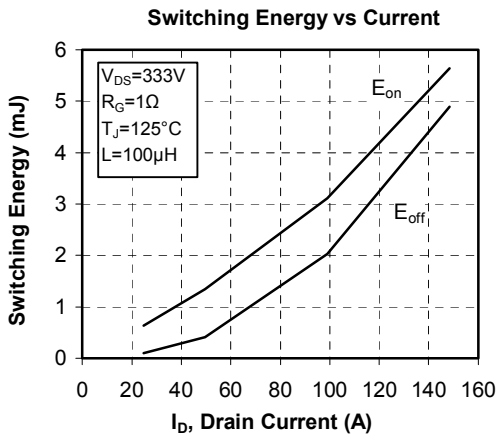
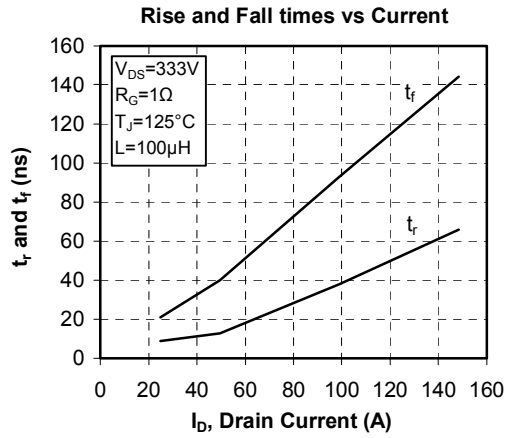
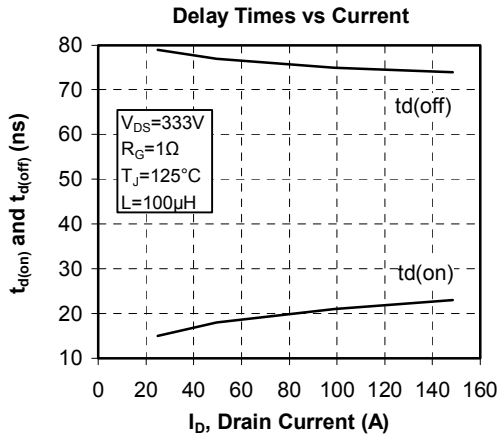
**RDS(on) vs Drain Current**



**DC Drain Current vs Case Temperature**







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