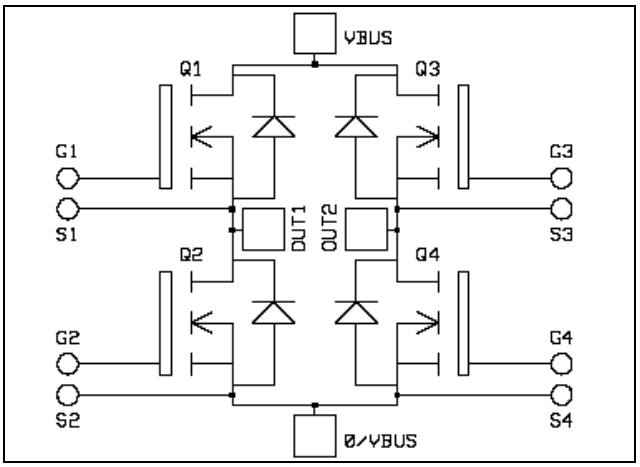
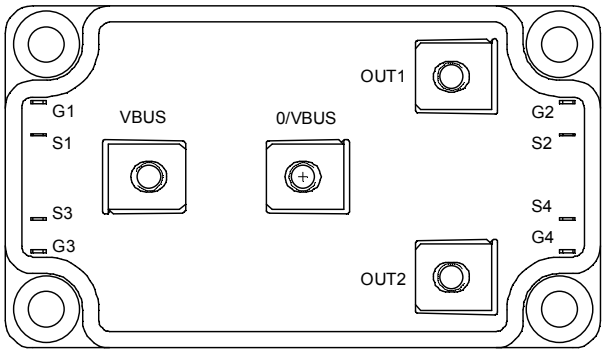
Full - Bridge MOSFET Power Module

V_{DSS} = 500V
R_{DSon} = 35mΩ max @ Tj = 25°C
I_D = 99A @ Tc = 25°C





Application

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

Features

- Power MOS 7® 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
  - M5 power connectors
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- 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°C	99	A
		T_c = 80°C	74	
I_{DM}	Pulsed Drain current		396	
V_{GS}	Gate - Source Voltage		±30	V
R_{DSon}	Drain - Source ON Resistance		35	mΩ
P_D	Maximum Power Dissipation	T_c = 25°C	781	W
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 Handing Procedures Should Be Followed.

All ratings @ T_j = 25°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 = 375µA		500			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0V,V_{DS} = 500V	T_j = 25°C			375	µA
		V_{GS} = 0V,V_{DS} = 400V	T_j = 125°C			1500	
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 10V, I_D = 49.5A				35	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 5mA		3		5	V
I_{GSS}	Gate – Source Leakage Current	V_{GS} = ±30 V, V_{DS} = 0V				±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			0.18		
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	**Inductive switching @ 125°C** V_{GS} = 15V V_{Bus} = 333V I_D = 99A R_G = 1Ω		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	**Inductive switching @ 25°C** V_{GS} = 15V, V_{Bus} = 333V I_D = 99A, R_G = 1Ω		2070		µJ
E_{off}	Turn-off Switching Energy ❷			1690		
E_{on}	Turn-on Switching Energy ❶	**Inductive switching @ 125°C** V_{GS} = 15V, V_{Bus} = 333V I_D = 99A, R_G = 1Ω		3112		µJ
E_{off}	Turn-off Switching Energy ❷			2026		

Source - Drain diode ratings and characteristics

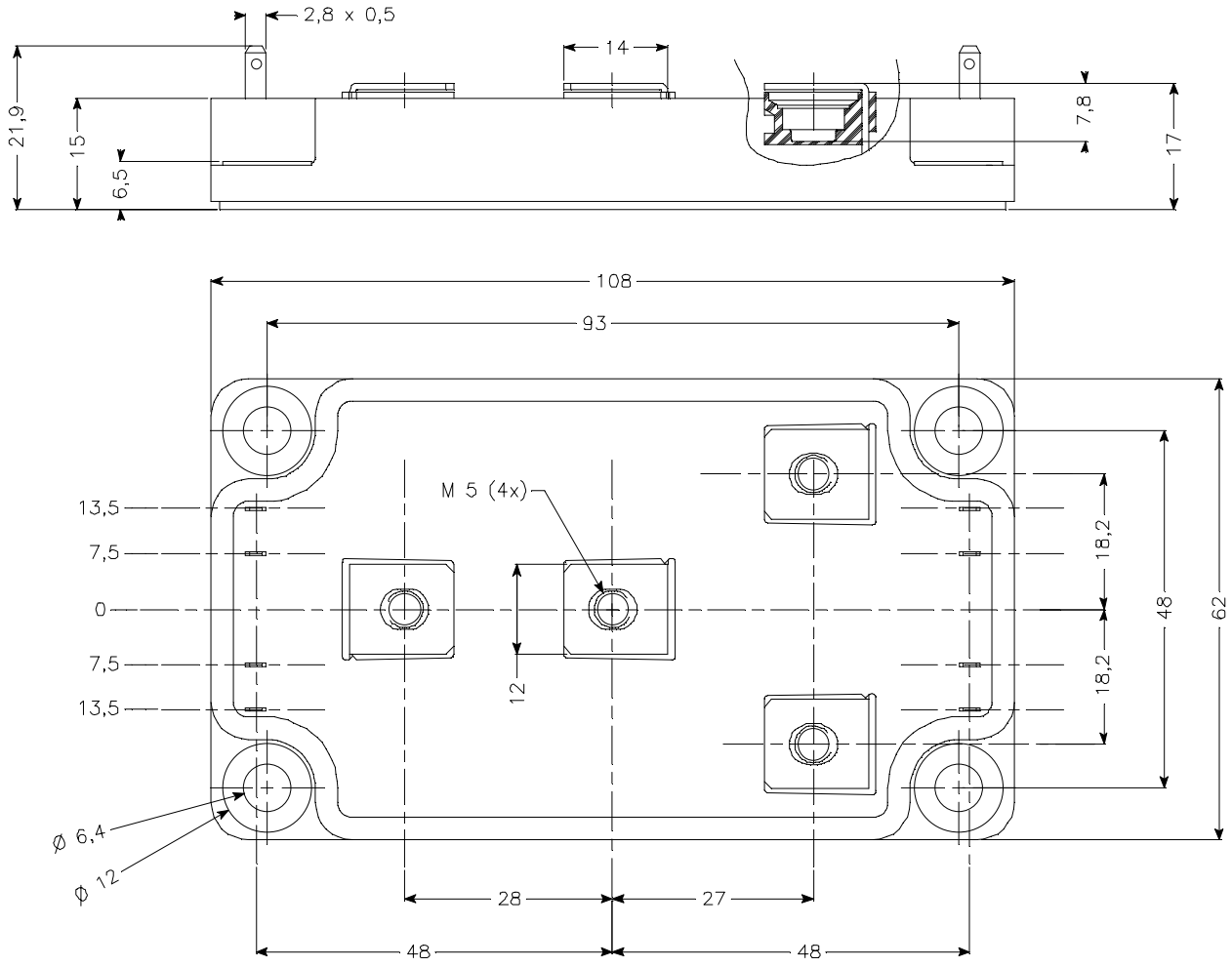
Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_S	Continuous Source current (Body diode)		Tc = 25°C			99	A
			Tc = 80°C			74	
V_{SD}	Diode Forward Voltage	V_{GS} = 0V, I_S = - 99A				1.3	V
dv/dt	Peak Diode Recovery ❸					15	V/ns
t_{rr}	Reverse Recovery Time	I_S = - 99A V_R = 250V di_S/dt = 200A/µs	T_j = 25°C			270	ns
			T_j = 125°C			540	
Q_{rr}	Reverse Recovery Charge	I_S = - 99A V_R = 250V di_S/dt = 200A/µs	T_j = 25°C		5.2		µC
			T_j = 125°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.
$I_S \le$ - 99A di/dt ≤ 700A/µs $V_R \le V_{DSS}$ $T_j \le$ 150°C

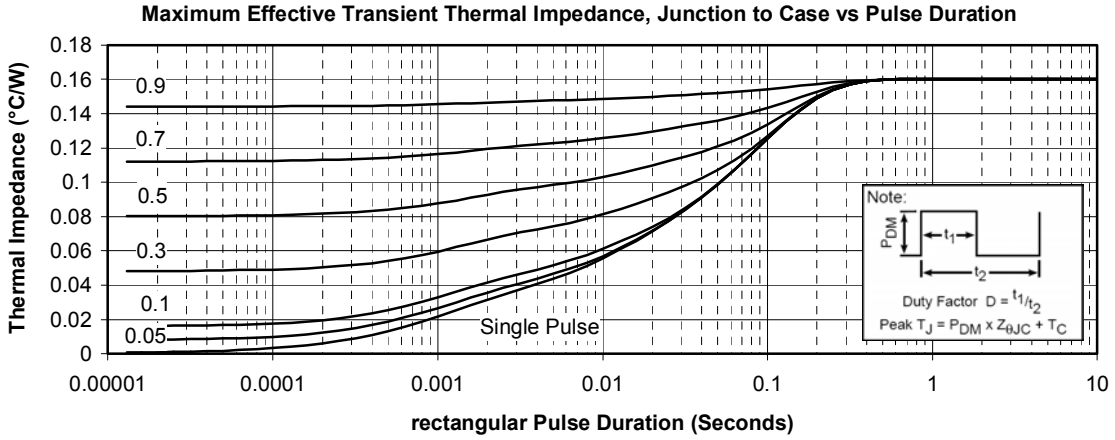
Thermal and package characteristics

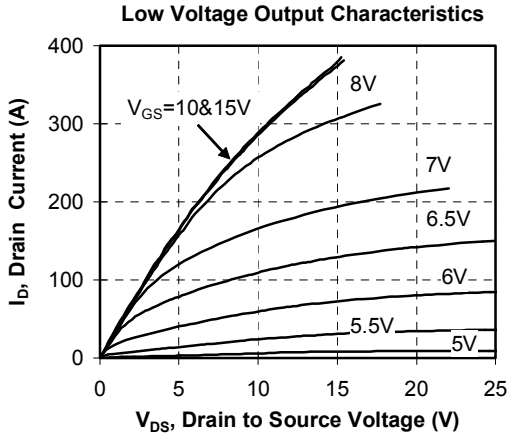
Symbol	*Characteristic*			*Min*	*Typ*	*Max*	*Unit*
R_{thJC}	Junction to Case					0.16	°C/W
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz			2500			V
T_J	Operating junction temperature range			-40		150	°C
T_{STG}	Storage Temperature Range			-40		125	
T_C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M6	3		5	N.m
		For terminals	M5	2		3.5	
Wt	Package Weight					280	g

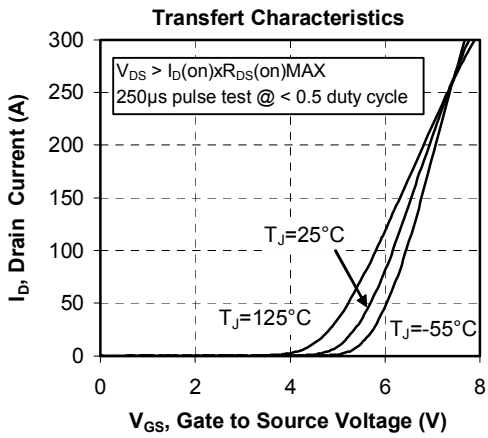
Package outline

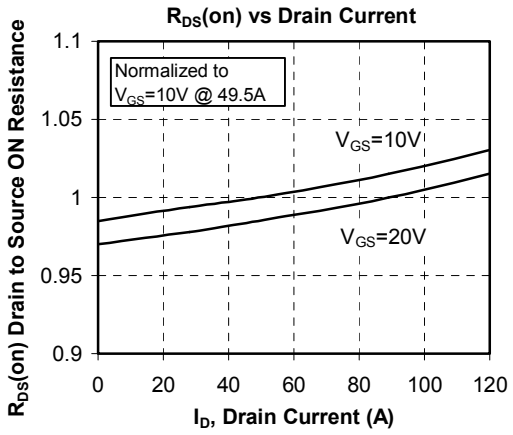


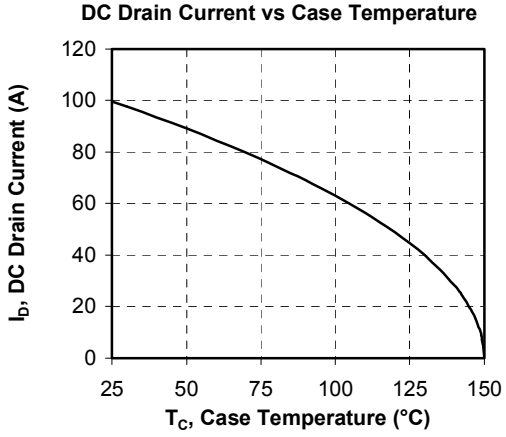
Typical Performance Curve



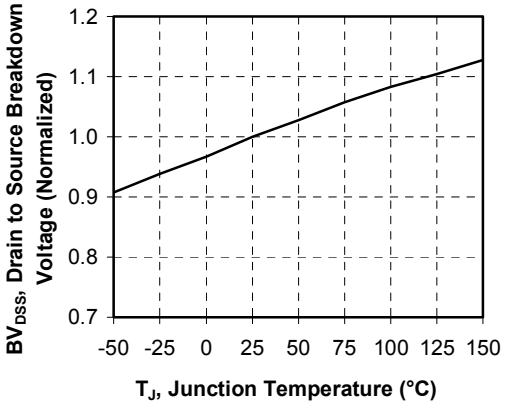




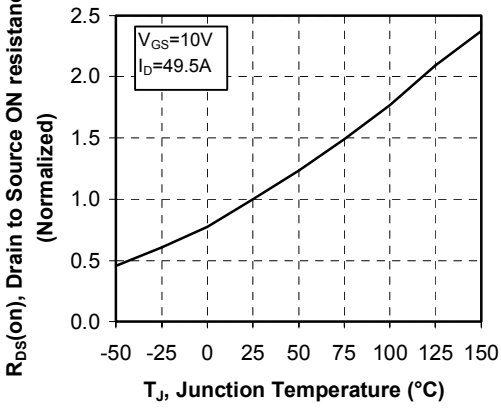




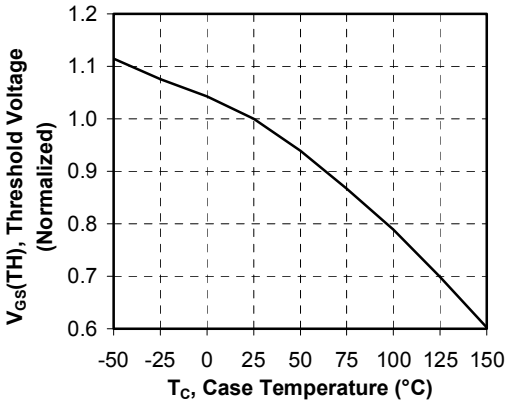
Breakdown Voltage vs Temperature



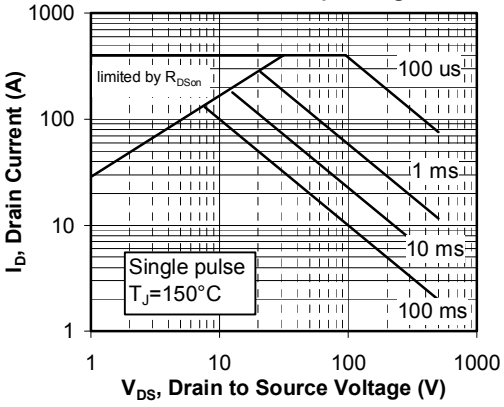
ON resistance vs Temperature



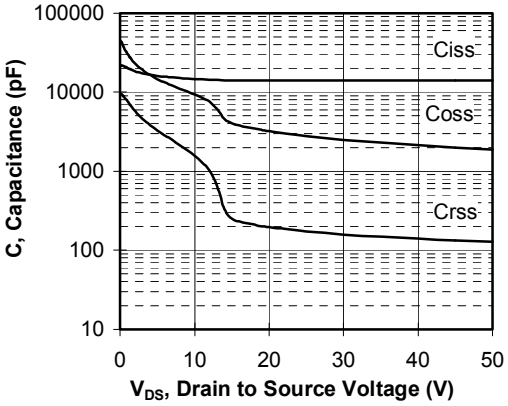
Threshold Voltage vs Temperature



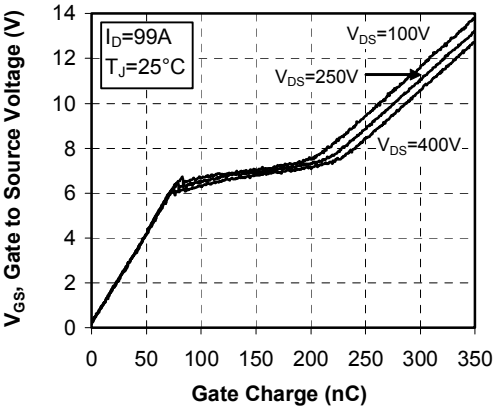
Maximum Safe Operating Area



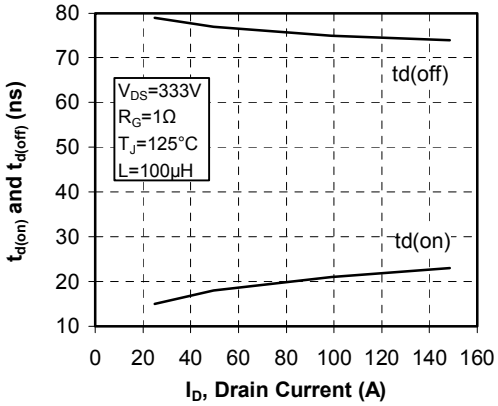
Capacitance vs Drain to Source Voltage



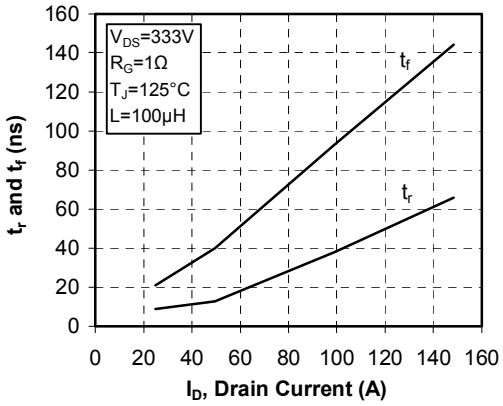
Gate Charge vs Gate to Source Voltage



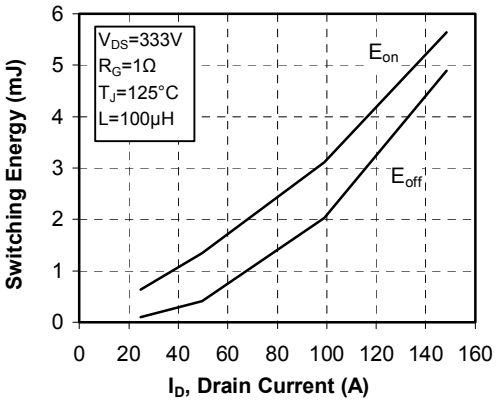
Delay Times vs Current



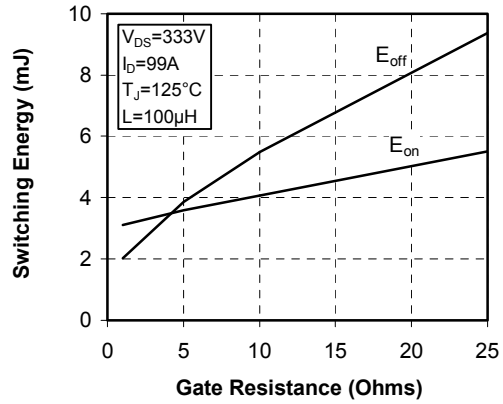
Rise and Fall times vs Current



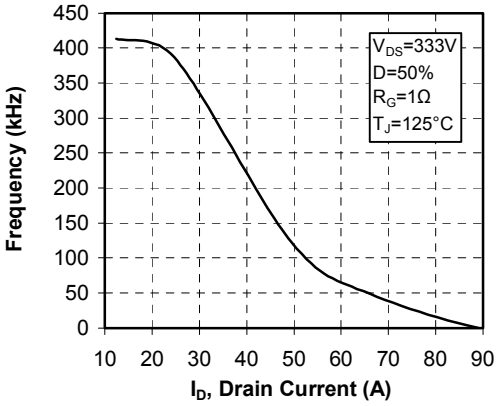
Switching Energy vs Current



Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage