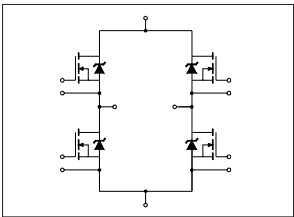


Features

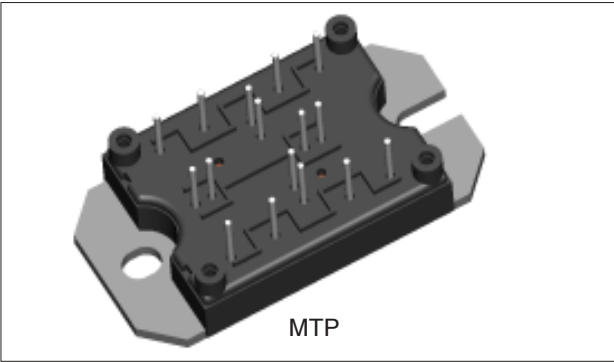
- Low On-Resistance
- High Performance Optimised Built-in Fast Recovery Diodes
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Aluminum Nitride DBC
- Very Low Stray Inductance Design for High Speed Operation



31 A
 $V_{DSS} = 500V$

Benefits

- Low Gate Charge Qg results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic dv/dt Ruggedness
- Low Trr and Soft Diode Reverse Recovery
- Optimized for Welding, UPS and SMPS Applications
- Outstanding ZVS and High Frequency Operation
- Direct Mounting to Heatsink
- PCB Solderable Terminals
- Very Low Junction-to-Case Thermal Resistance
- UL Approved E78996 



Absolute Maximum Ratings

Parameters			Max	Units
ID	Continuous Drain Current @ VGS = 10V	@ TC = 25°C	31	A
		@ TC = 100°C	19	
IDM	Pulsed Drain Current (1)		124	
PD	Maximum Power Dissipation	@ TC = 25°C	1140	W
		@ TC = 100°C	456	
VGS	Gate-to-Source Voltage		± 30	V
VISOL	RMS Isolation Voltage, Any Terminal to Case, t = 1 min		2500	
dv/dt	Peak Diode Recovery dv/dt (3)		15	V/ ns

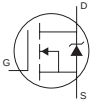
Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameters	Min	Typ	Max	Units	Test Conditions
$V_{(BR)DSS}$ Drain-to-Source Breakdown Voltage	500			V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS} / \Delta T_J$ Temperature Coeff. of Breakdown Voltage		0.48		V/ $^\circ\text{C}$	$I_D = 4mA$, reference to $T_J = 25^\circ\text{C}$
$R_{DS(ON)}$ Static Drain-to-Source On-Resistance		0.19	0.22	Ω	$V_{GS} = 10V, I_D = 19A$ (4)
		0.21	0.25		$V_{GS} = 10V, I_D = 31A$
$V_{GS(th)}$ Gate Threshold Voltage	3.0		6.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS} Drain-to-Source Leakage Current (6)			50	μA	$V_{DS} = 500V, V_{GS} = 0V$
			2	mA	$V_{DS} = 400V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS} Gate-to-Source Forward Leakage			150	nA	$V_{GS} = 30V$
Gate-to-Source Reverse Leakage			-150		$V_{GS} = -30V$

Dynamic Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameters	Min	Typ	Max	Units	Test Conditions
g_{fs} Forward Transconductance		26		S	$V_{DS} = 50V, I_D = 19A$
Q_g Total Gate Charge		105	160	nC	$I_D = 31A$
Q_{gs} Gate-to-Source Charge		36	55		$V_{DS} = 400V$
Q_{gd} Gate-to-Drain ("Miller") Charge		46	70		$V_{GS} = 10V$ (4)
$t_{d(on)}$ Turn-on Delay Time		49	74	ns	$I_D = 31A$
$t_{d(off)}$ Turn-off Delay Time		80	120		$V_{DS} = 250V$
t_r Rise Time		165	250		$V_{GS} = 10V$
t_f Fall Time		76	115		$R_G = 4.3\Omega$
C_{iss} Input Capacitance		4808	7210	pF	$V_{GS} = 0V$
C_{oss} Output Capacitance		1165	1750		$V_{DS} = 25V$
C_{rss} Reverse Transfer Capacitance		40	60		$f = 1.0\text{ MHz}$

Diode Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameters	Min	Typ	Max	Units	Test Conditions
I_S Continuous Source Current (Body Diode)			31	A	MOSFET symbol showing the integral reverse p-n junction diode 
I_{SM} Pulsed Source Current (Body Diode) (1)			124		
V_{SD} Diode Forward Voltage		1.01	1.1	V	$T_J = 25^\circ\text{C}, I_S = 31A, V_{GS} = 0V$ (4)
t_{rr} Reverse Recovery Time		252	378	ns	$T_J = 125^\circ\text{C}, I_F = 31A$
Q_{rr} Reverse Recovery Charge		1619	2428	nC	$di/dt = 100A/\mu s$ (4)

Avalanche Characteristics

Parameters	Min	Typ	Max	Units
E _{AS} Single Pulse Avalanche Energy (2)			493	mJ
I _{AR} Avalanche Current (1)			31	A
E _{AR} Repetitive Avalanche Energy (1)			114	mJ

Thermal- Mechanical Specifications

Parameters	Min	Typ	Max	Units
T _J Operating Junction Temperature Range	- 40		150	°C
T _{STG} Storage Temperature Range	- 40		125	
R _{thJC} Junction-to-Case (per MOSFET)			0.44	°C/ W
R _{thCS} Case-to-Sink (Heatsink Compound Thermal Conductivity = 1 W/mK)		0.06		
Clearance ⁽⁵⁾ (external shortest distance in air between two terminals)	5.5			mm
Creepage ⁽⁵⁾ (shortest distance along external surface of the insulating material between 2 terminals)	8			
Weight		66		g

Notes:

- (1) Repetitive rating; pulse width limited by max. junction temperature
 (2) Starting T_J = 25°C, L = 1.0mH, R_G = 25Ω
 I_{AS} = 31A

- (3) I_{SD} ≤ 31A, di/dt ≤ 340 A/μs, V_{DD} ≤ V_{(BR)DSS},
 T_J ≤ 150°C

- (4) Pulse width ≤ 400μs; duty cycle ≤ 2%

- (5) Standard version only i.e. without optional thermistor

- (6) I_{CES} includes also opposite leg overall leakage

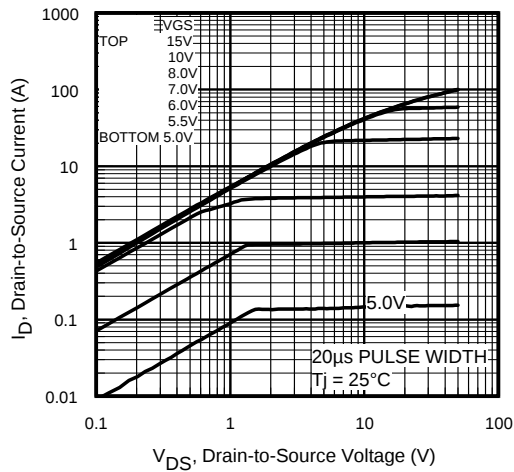


Fig 1. Typical Output Characteristics

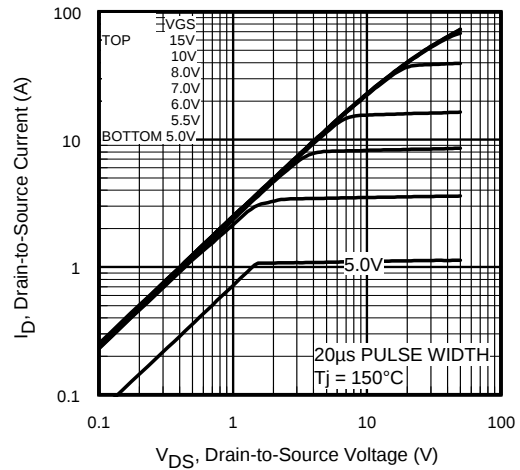


Fig 2. Typical Output Characteristics

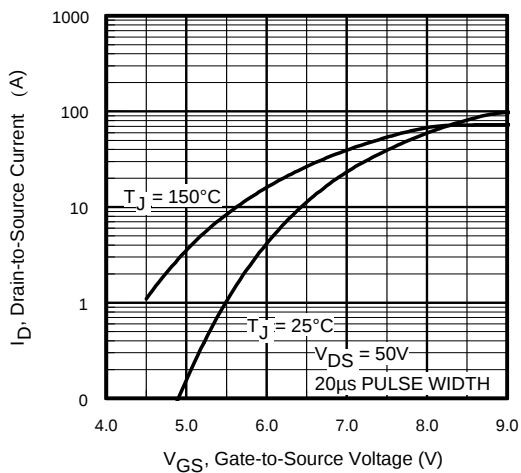
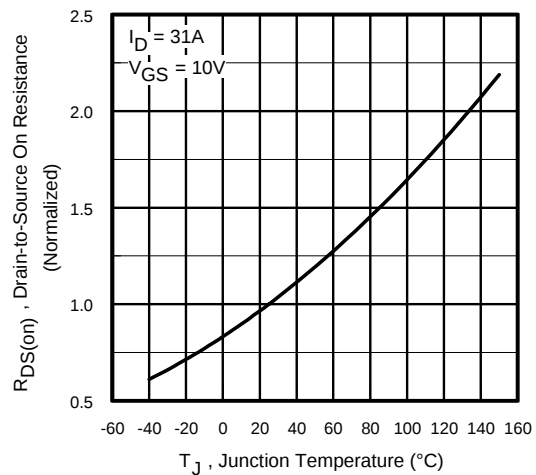


Fig 3. Typical Transfer Characteristics

Fig 4. Normalized On-Resistance
Vs. Temperature

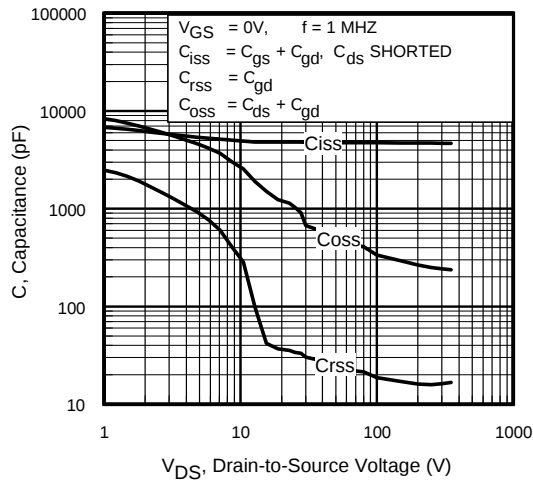


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

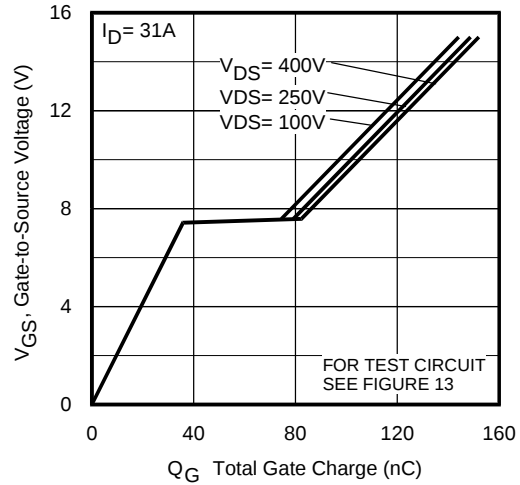


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

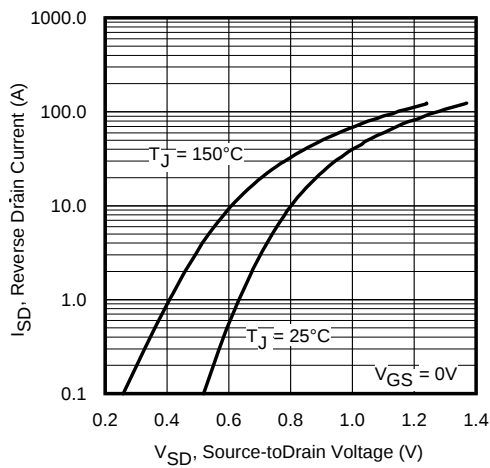


Fig 7. Typical Source-Drain Diode Forward Voltage

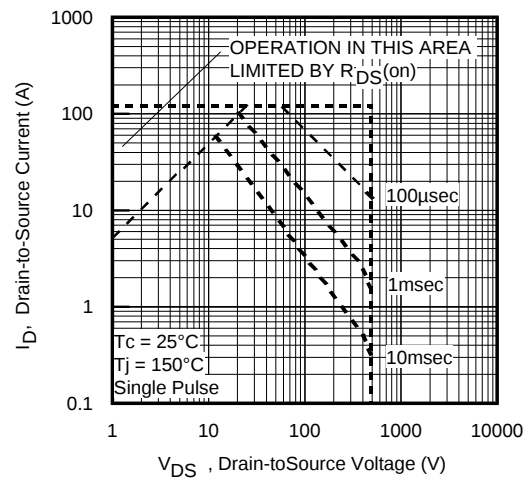


Fig 8. Maximum Safe Operating Area

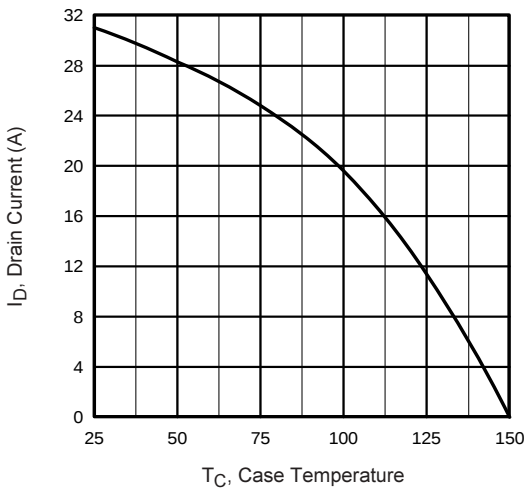


Fig 9. Maximum Drain Current Vs. Case Temperature

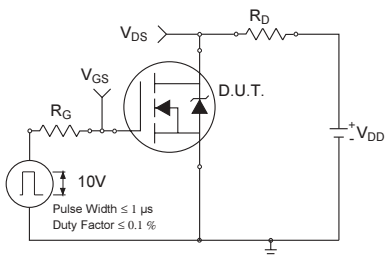


Fig 10a. Switching Time Test Circuit

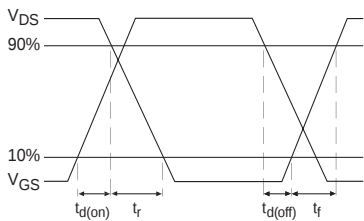


Fig 10b. Switching Time Waveforms

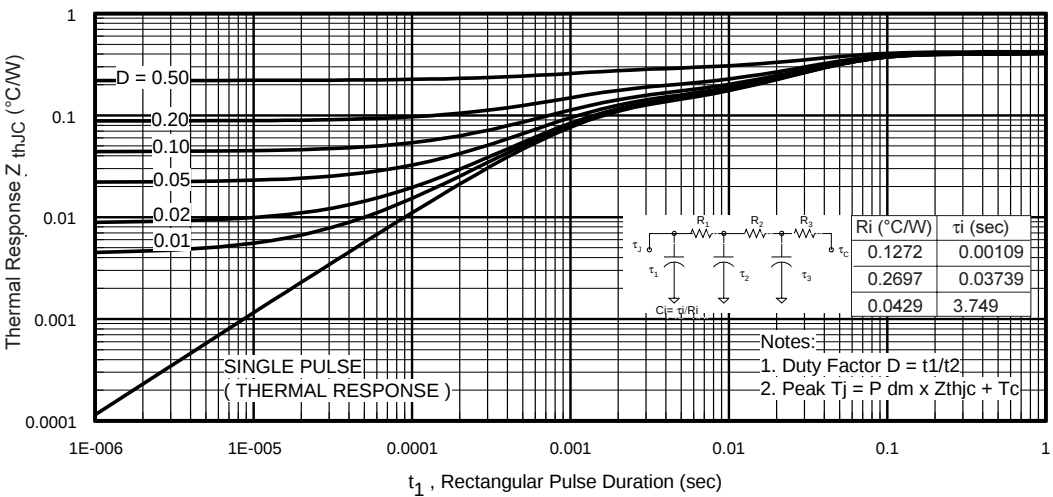


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

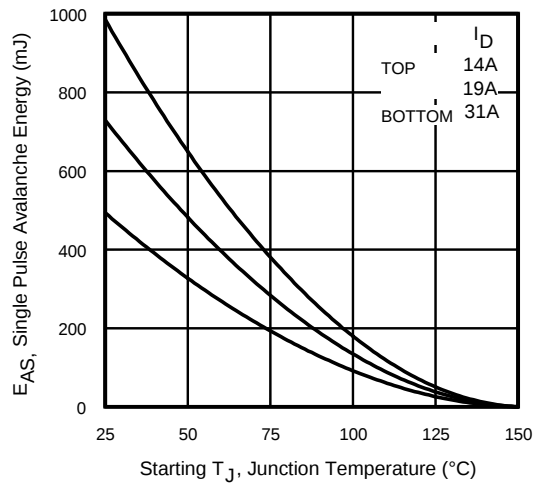


Fig 12a. Maximum Avalanche Energy Vs. Drain Current

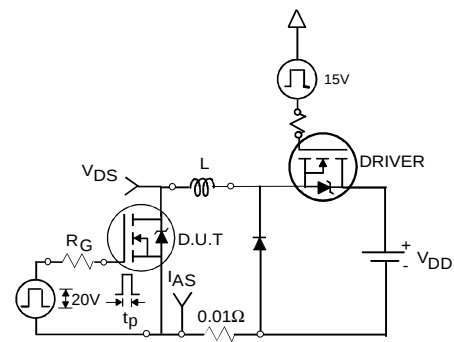


Fig 12b. Unclamped Inductive Test Circuit and vs Junction Temperature

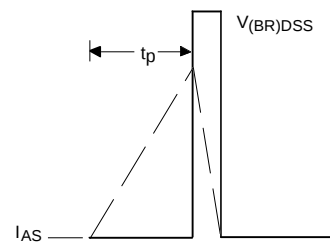


Fig 12c. Unclamped Inductive Waveforms

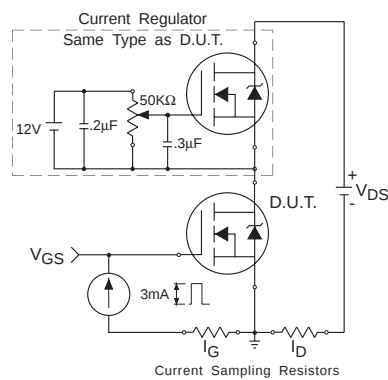


Fig 13a. Gate Charge Test Circuit

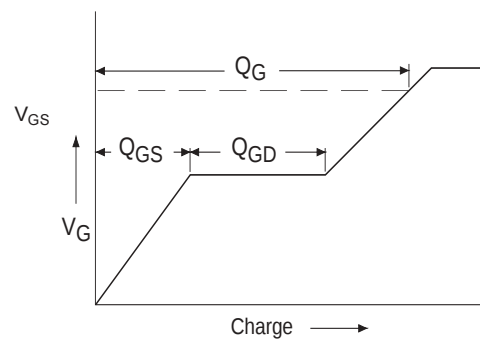
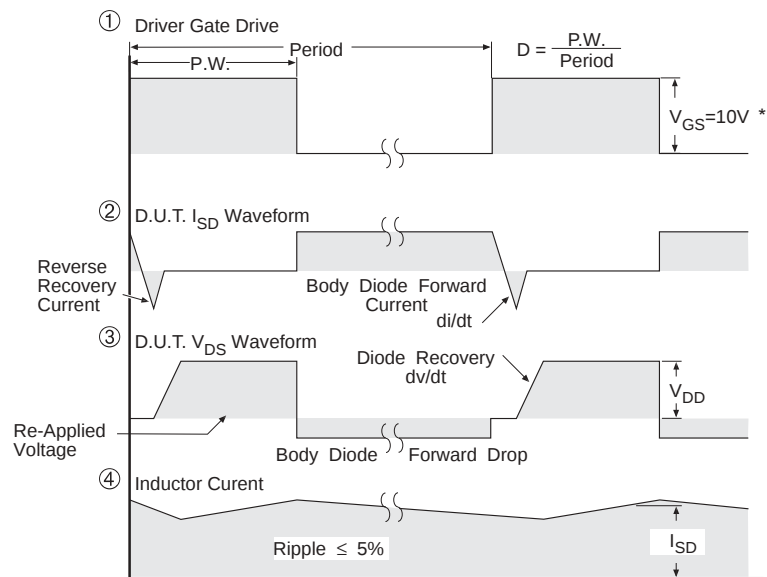
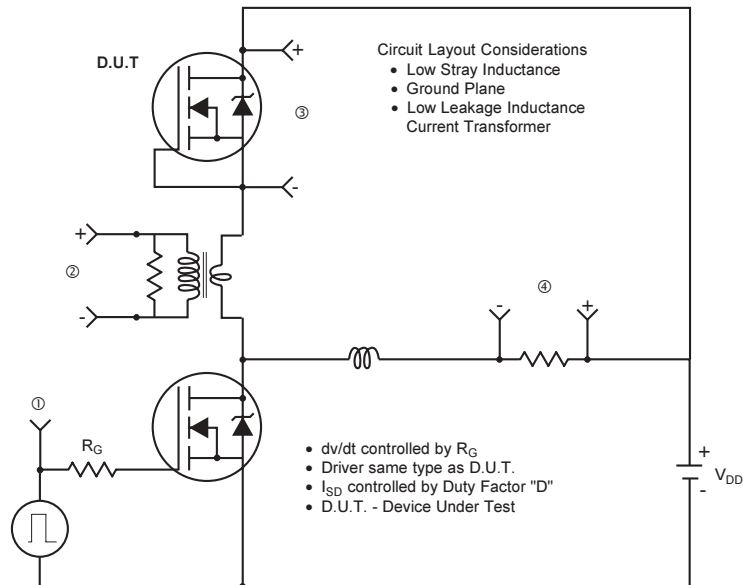


Fig 13b. Basic Gate Charge Waveform

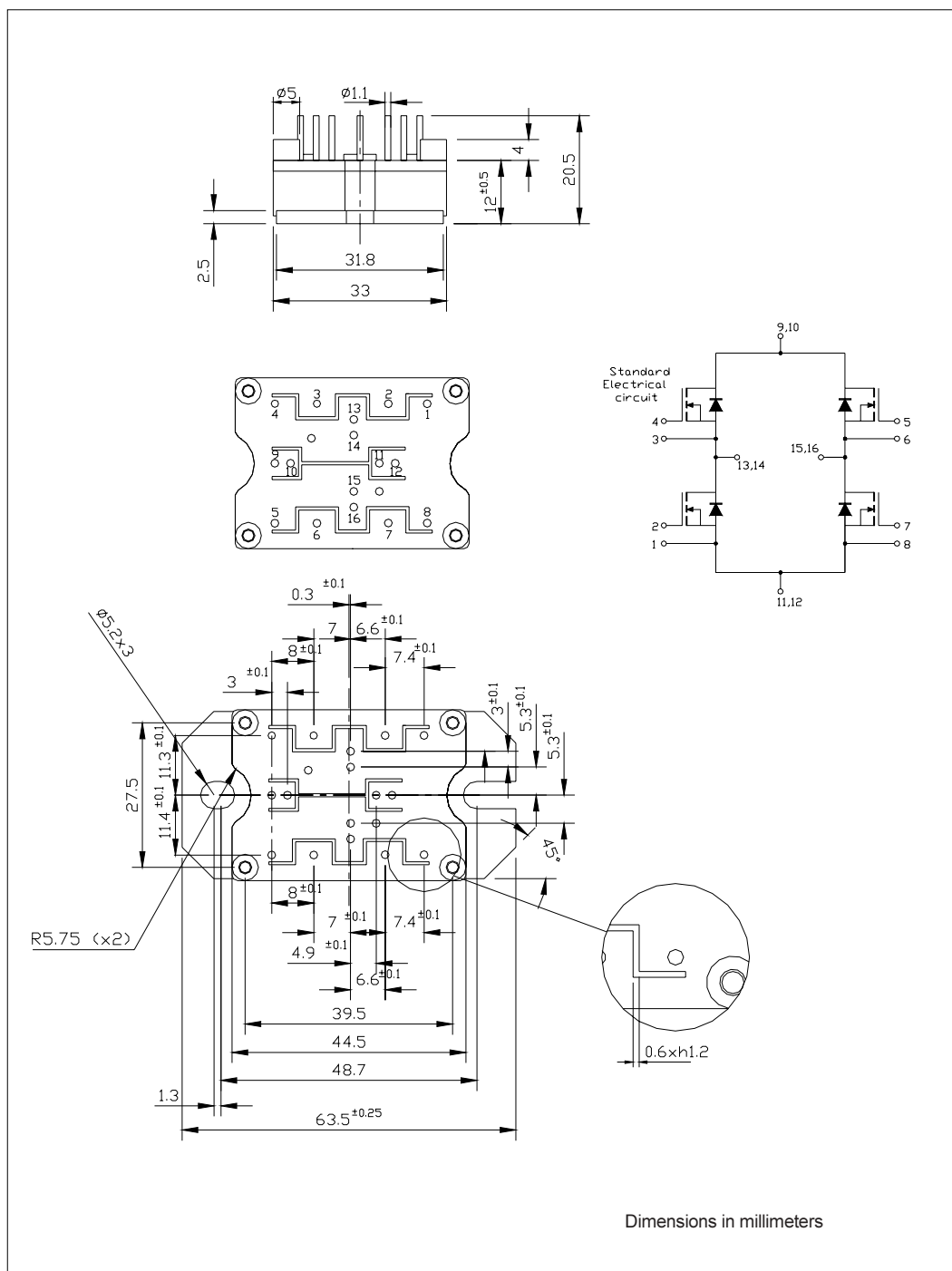
Peak Diode Recovery dv/dt Test Circuit



* $V_{GS} = 5V$ for Logic Level Devices

Fig 14. For N-Channel HEXFET® Power MOSFETs

Outline Table



Ordering Information Table

Device Code		19	MT	050	X	F
		1	2	3	4	5
1	-	Current rating (19 = 19A)				
2	-	Essential Part Number				
3	-	Voltage code (050 = 500V)				
4	-	Speed/ Type (X = HexFet)				
5	-	Circuit Configuration (F = Full Bridge)				

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level.
Qualification Standards can be found on IR's Web site.



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