Bulletin I27128 Rev.C 07/03

International
IOR Rectifier

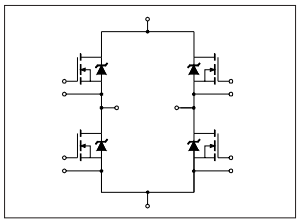
19MT050XF

"FULL-BRIDGE" FREDFET MTP

HEXFET® Power MOSFET

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

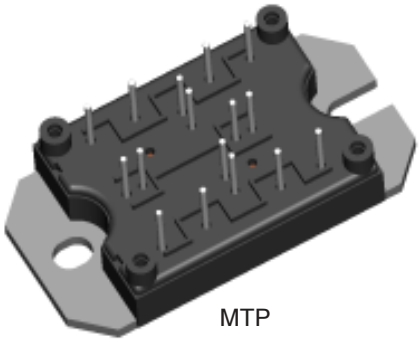


31 A

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



MTP

Absolute Maximum Ratings

	Parameters		Max	Units
I_D	Continuos Drain Current @ V_{GS} = 10V	@ T_C = 25°C	31	A
		@ T_C = 100°C	19	
I_{DM}	Pulsed Drain Current (1)		124	
P_D	Maximum Power Dissipation	@ T_C = 25°C	1140	W
		@ T_C = 100°C	456	
V_{GS}	Gate-to-Source Voltage		± 30	V
V_{ISOL}	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°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 = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage		0.48		V/°C	I_D = 4mA, reference to T_J = 25°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 = 250µA
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°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°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 = 4.3Ω
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 MHz

Diode Characteristics @ T_J = 25°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°C, I_S = 31A, V_{GS} = 0V (4)
t_{rr}	Reverse Recovery Time		252	378	ns	T_J = 125°C, I_F = 31A
Q_{rr}	Reverse Recovery Charge		1619	2428	nC	di/dt = 100A/µs (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) $I_{SD} \leq$ 31A, di/dt ≤ 340 A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 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

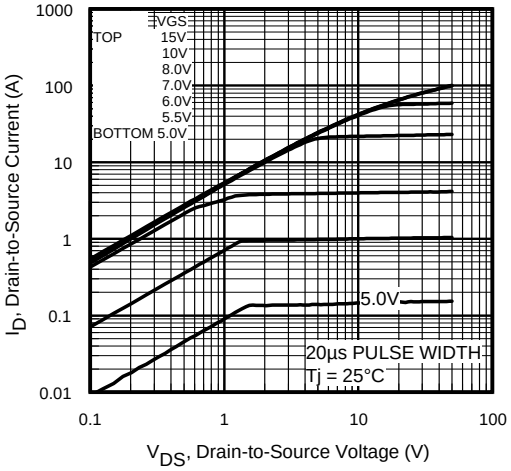


Fig 1. Typical Output Characteristics

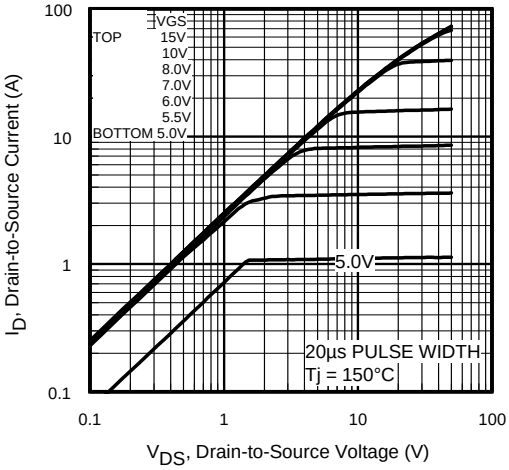


Fig 2. Typical Output Characteristics

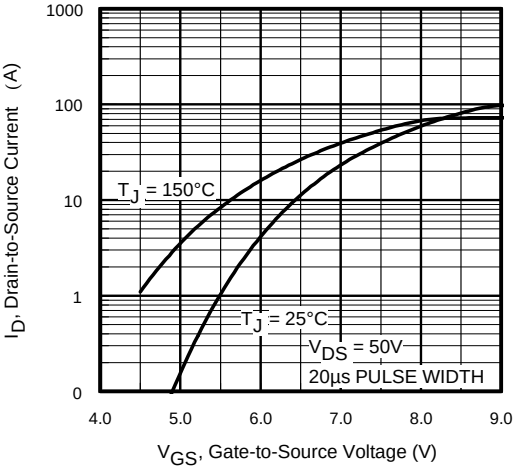


Fig 3. Typical Transfer Characteristics

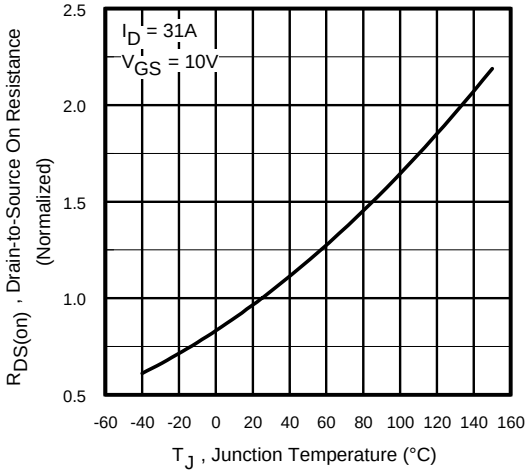


Fig 4. Normalized On-Resistance Vs. Temperature

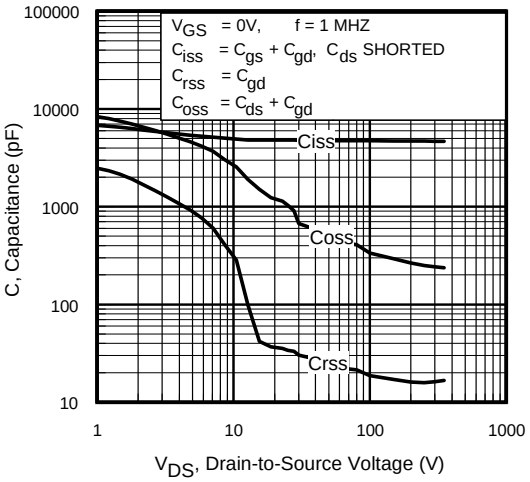


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

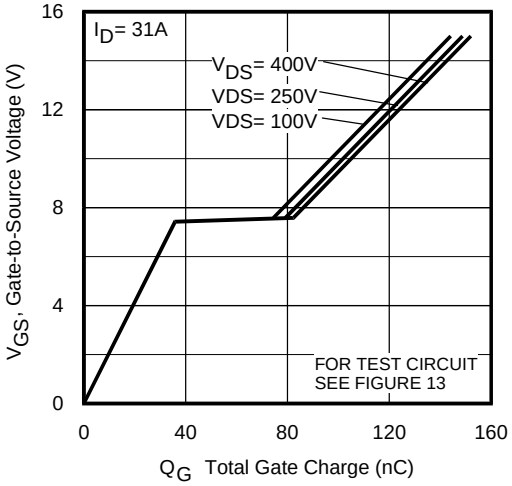


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

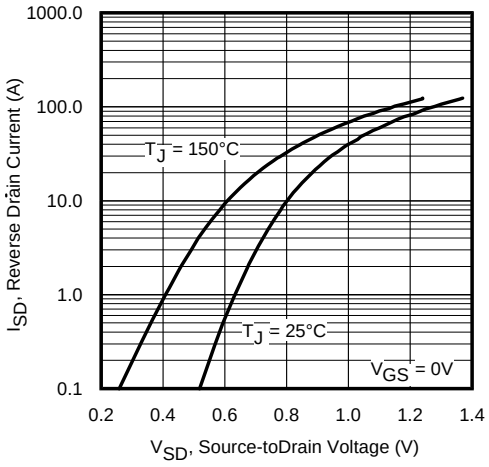


Fig 7. Typical Source-Drain Diode Forward Voltage

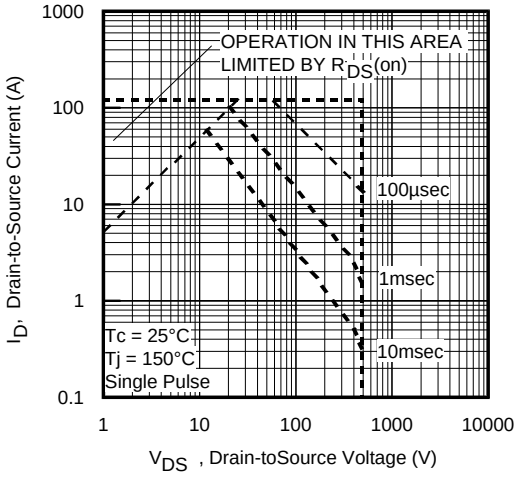


Fig 8. Maximum Safe Operating Area

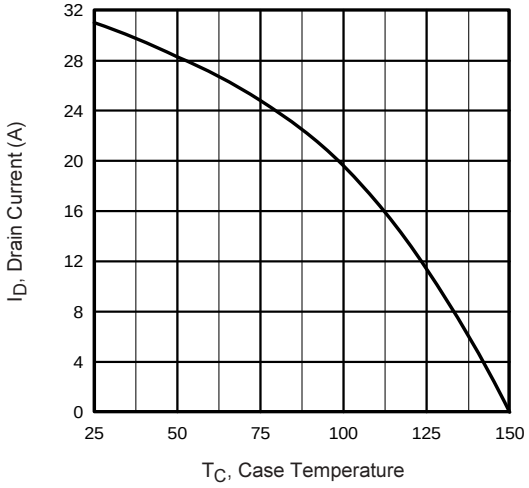


Fig 9. Maximum Drain Current Vs. Case Temperature

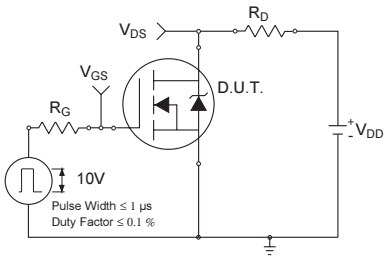


Fig 10a. Switching Time Test Circuit

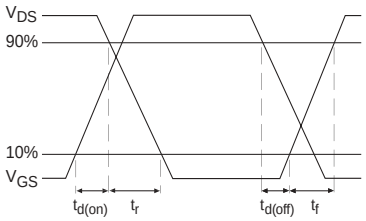


Fig 10b. Switching Time Waveforms

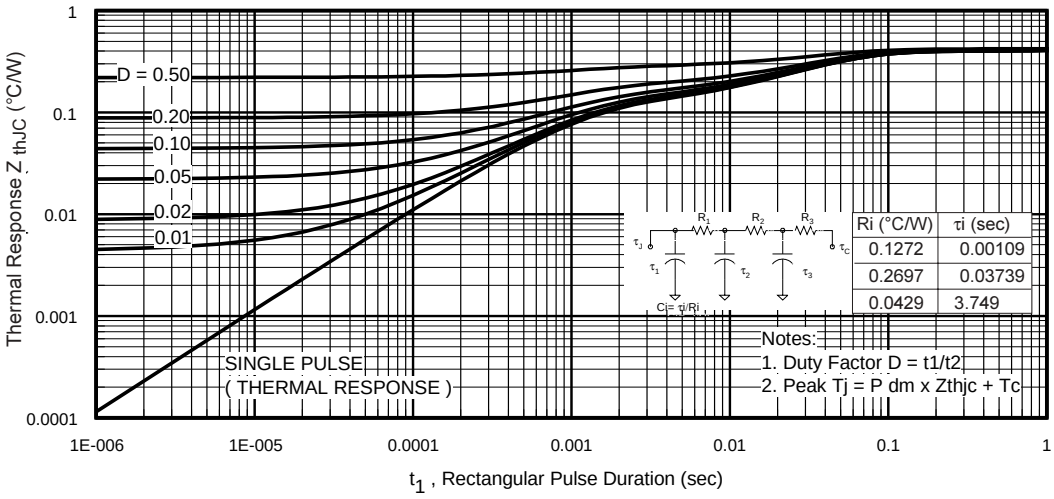


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

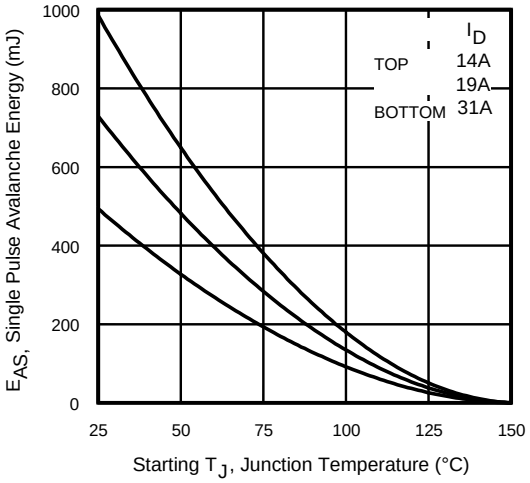


Fig 12a. Maximum Avalanche Energy Vs. Drain Current

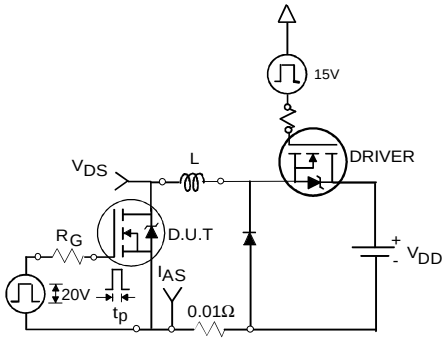


Fig 12b. Unclamped Inductive Test Circuit and vs Junction Temperature

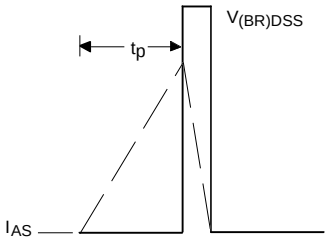


Fig 12c. Unclamped Inductive Waveforms

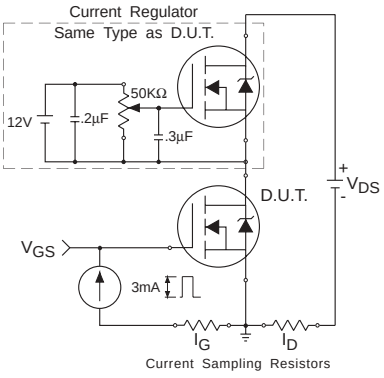


Fig 13a. Gate Charge Test Circuit

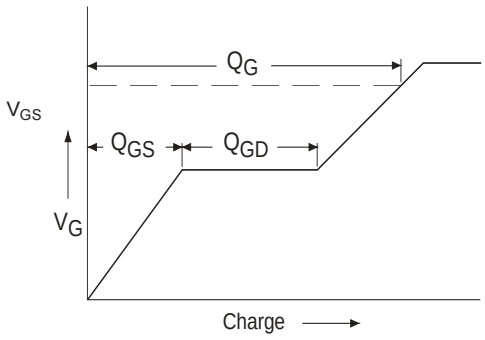


Fig 13b. Basic Gate Charge Waveform

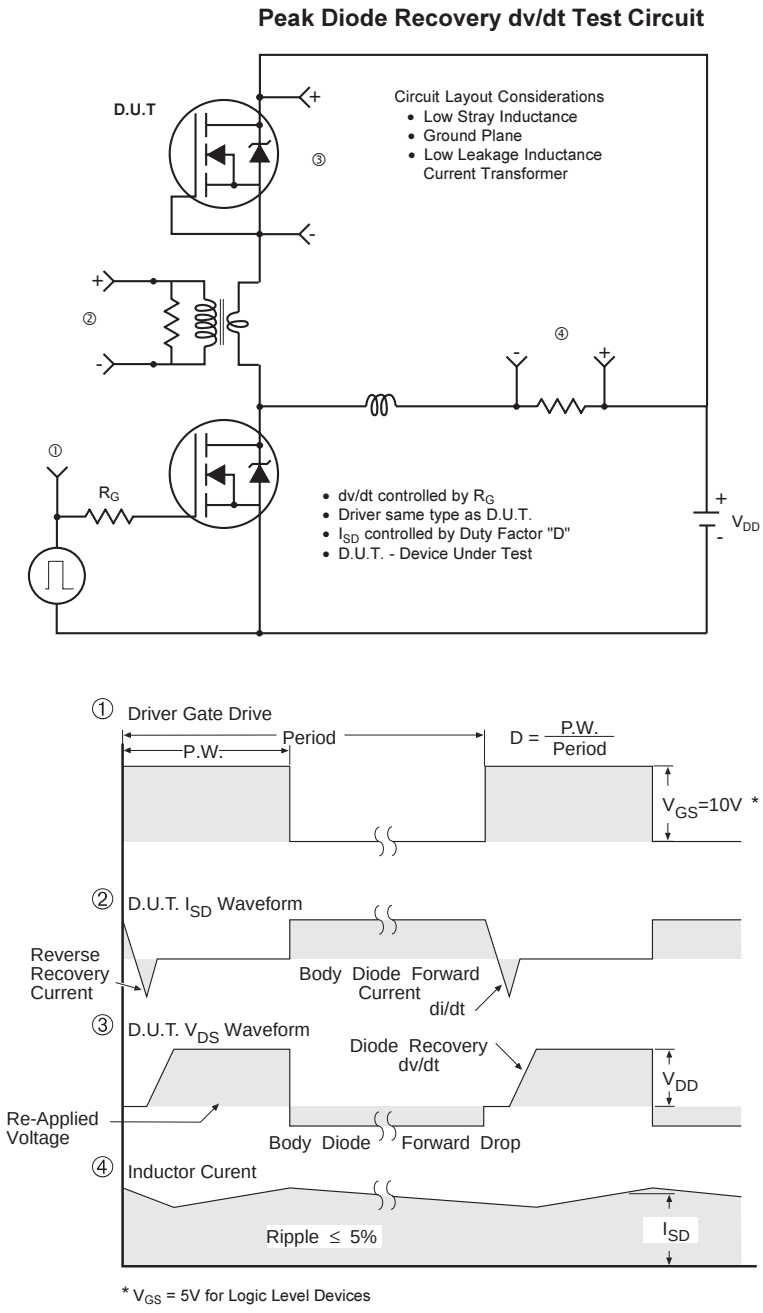
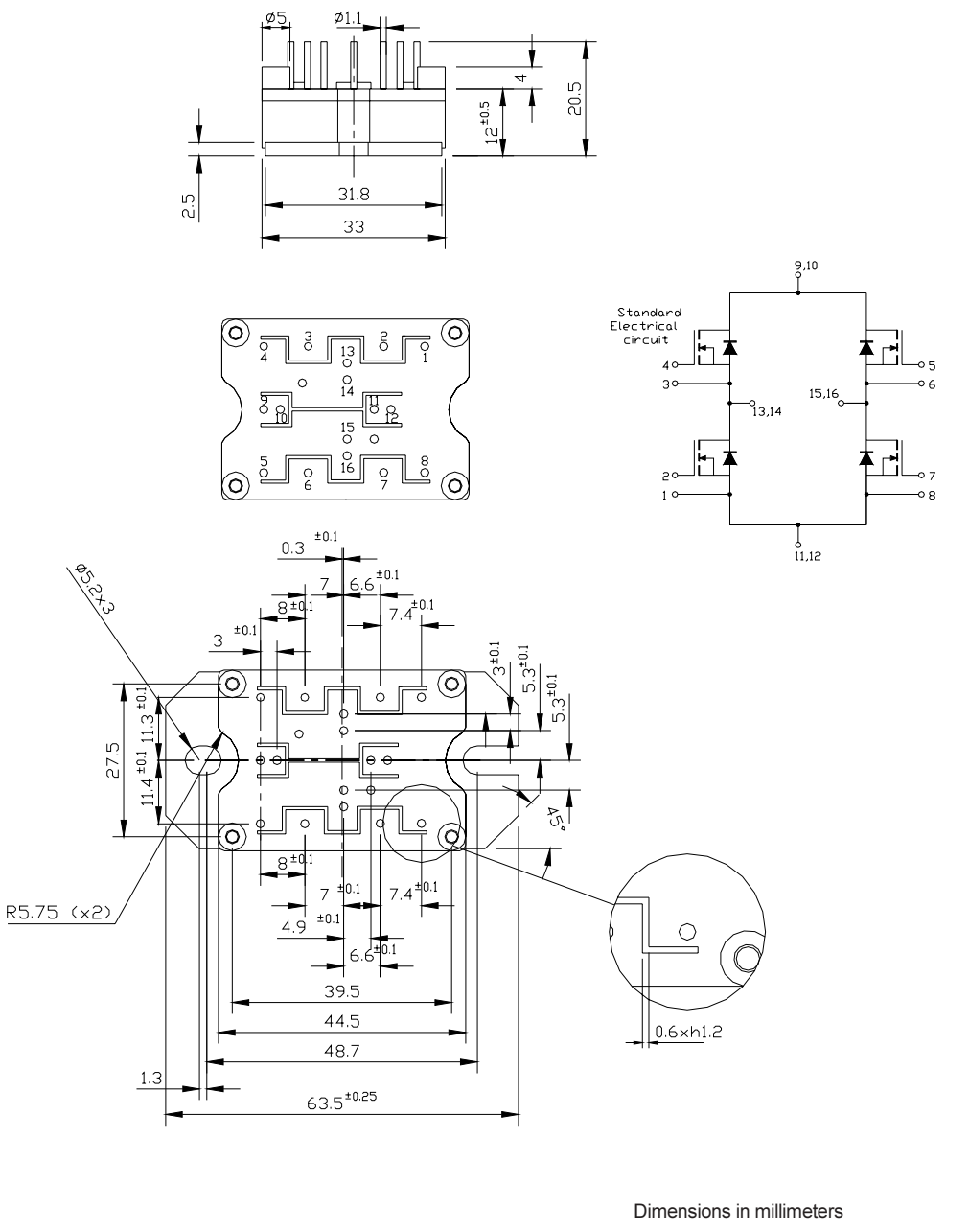


Fig 14. For N-Channel HEXFET® Power MOSFETs

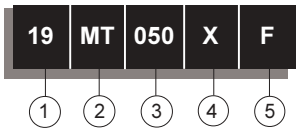
Outline Table



Dimensions in millimeters

Ordering Information Table

Device Code



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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