RoHS Compliant

Magnachip

MDQ14N049TH

Single N-channel Trench MOSFET 135V, 160A, 4.9mΩ

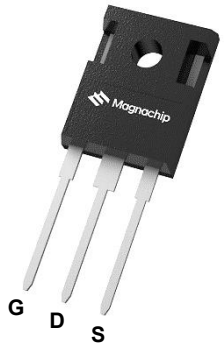
General Description

The MDQ14N049TH, Magnachip's latest generation of MV MOSFET Technology, which provides high performance in the lowest Rds(on), fast switching performance, and excellent quality.

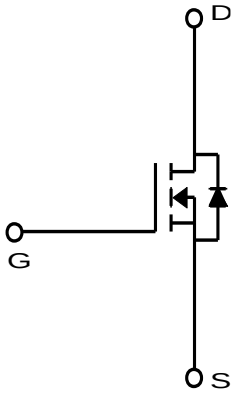
These devices can also be utilized in industrial applications such as Low Power Drives of E-bike, Light electric vehicles, DC/DC converter, and general purpose applications.

Features

- V_{DS} = 135V
- I_D = 160A @V_{GS} = 10V
- Very low on-resistance $R_{DS(ON)}$ < 4.9 mΩ @V_{GS} = 10V
- 175 °C operating temperature
- 100% UIL Tested
- 100% Rg Tested
- 100% △V_{DS} Tested



TO-247



Absolute Maximum Ratings (T_J = 25 °C)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	135	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (1)	T_C=25°C (Silicon Limited)	I_D	195	A
	T_C=100°C (Silicon Limited)		138	
	T_C=25°C (Package Limited)		160	
Pulsed Drain Current (2)		I_{DM}	640	
Power Dissipation	T_C=25°C	P_D	375	W
	T_C=100°C		187	
Single Pulse Avalanche Energy (3)		E_{AS}	450	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~175	°C

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient (1)	$R_{\theta JA}$	40	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.4	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDQ14N049TH	-55~175°C	TO-247	Tube	Halogen Free

Electrical Characteristics (T_J =25°C)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = 250μA, V_{GS} = 0V	135	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.5	-	3.9	
Drain Cut-Off Current	I_{DSS}	V_{DS} = 135V, V_{GS} = 0V	-	-	1.0	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±0.1	
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 50A	-	4.2	4.9	mΩ
Forward Transconductance	g_{fs}	V_{DS} = 10V, I_D = 50A	-	122	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS} = 70V, I_D = 50A, V_{GS} = 10V	-	123	-	nC
Gate-Source Charge	Q_{gs}		-	41	-	
Gate-Drain Charge	Q_{gd}		-	22	-	
Input Capacitance	C_{iss}	V_{DS} = 70V, V_{GS} = 0V, f = 1.0MHz	-	9,267	-	pF
Reverse Transfer Capacitance	C_{rss}		-	27	-	
Output Capacitance	C_{oss}		-	923	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 70V, I_D = 50A , R_G = 3.0Ω	-	36	-	ns
Rise Time	t_r		-	21	-	
Turn-Off Delay Time	$t_{d(off)}$		-	83	-	
Fall Time	t_f		-	13	-	
Gate Resistance	Rg	f=1 MHz	-	3	-	Ω
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 50A, V_{GS} = 0V	-	0.9	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 50A, dI/dt = 125A/μs	-	117	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	538	-	nC

Note :

1. Surface mounted FR-4 board by JEDEC (jesd51-7). Continuous current at T_C=25℃ is silicon limited
2. Pulse width limited by T_{Jmax}
3. E_{AS} is tested at starting Tj = 25℃, L = 1.0mH, I_{AS} = 30A, V_{GS} = 10V

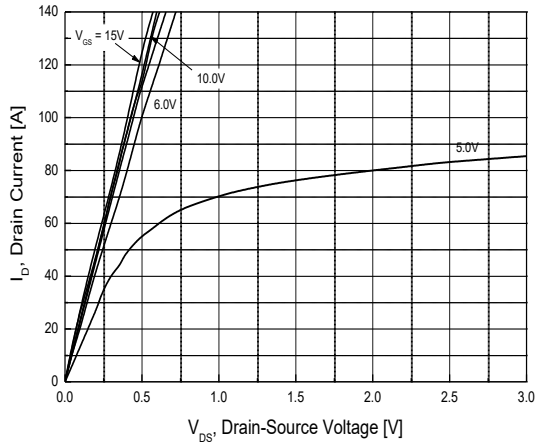


Fig.1 On-Region Characteristics

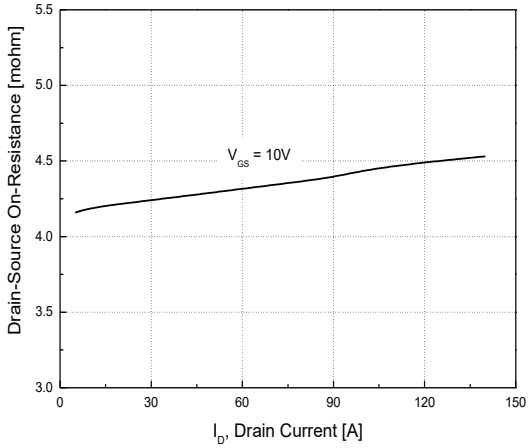


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

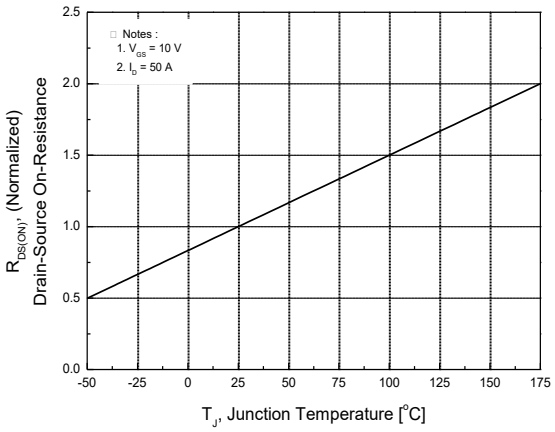


Fig.3 On-Resistance Variation with Temperature

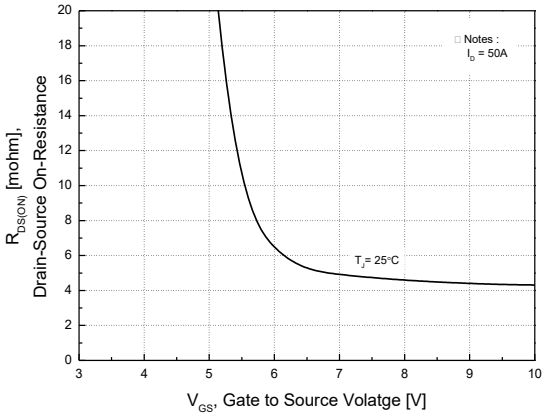


Fig.4 On-Resistance Variation with Gate to Source Voltage

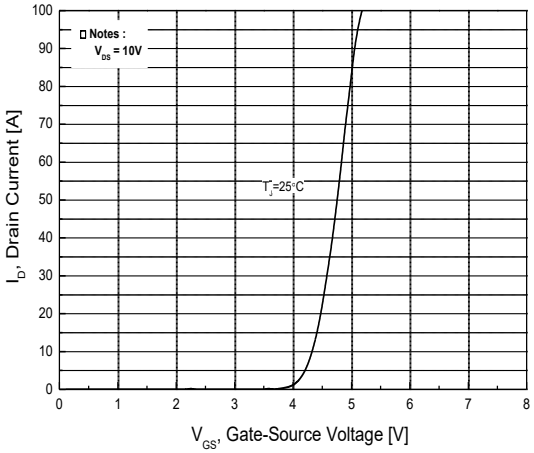


Fig.5 Transfer Characteristics

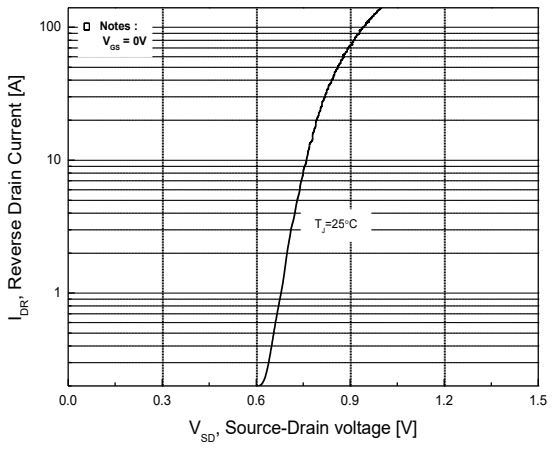


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

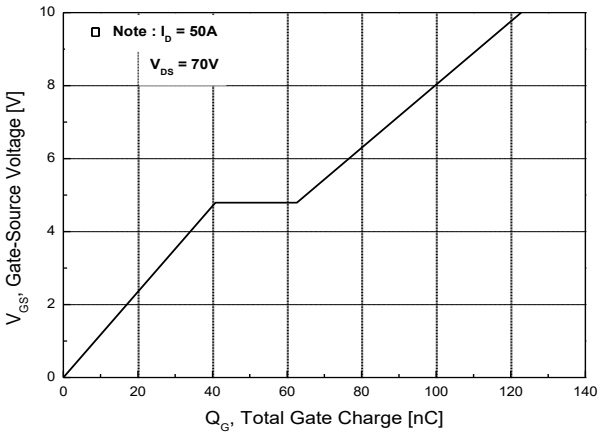


Fig.7 Gate Charge Characteristics

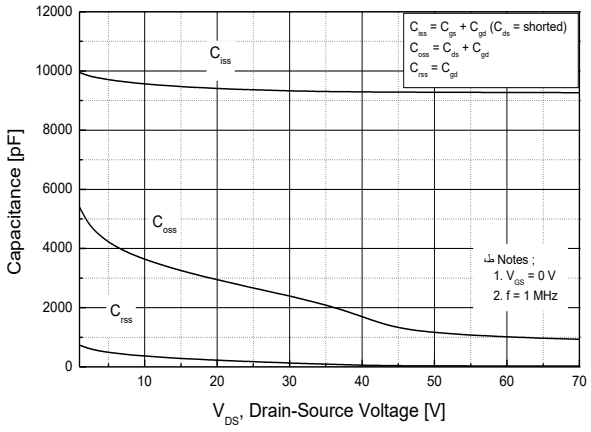


Fig.8 Capacitance Characteristics

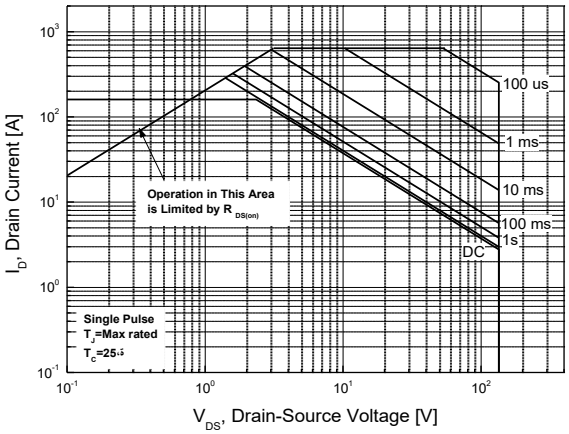


Fig.9 Maximum Safe Operating Area

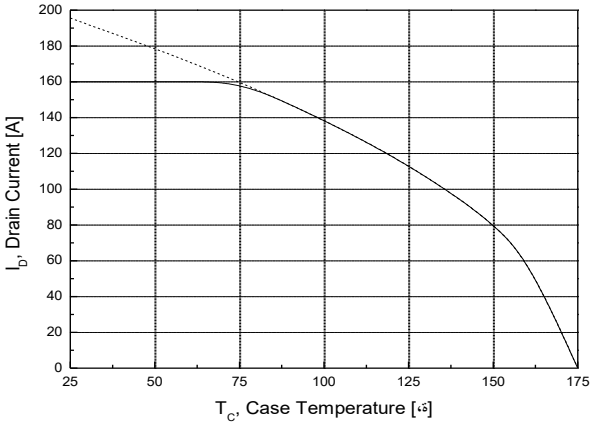


Fig.10 Maximum Drain Current vs. Case Temperature

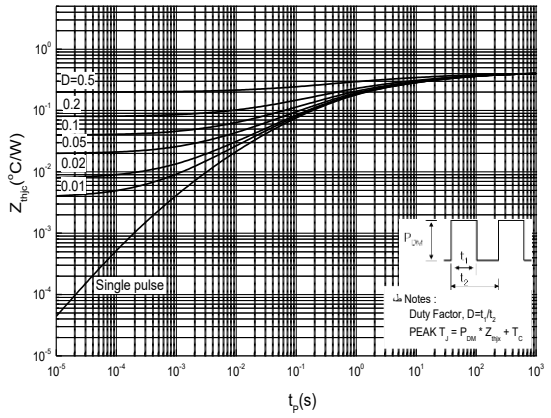
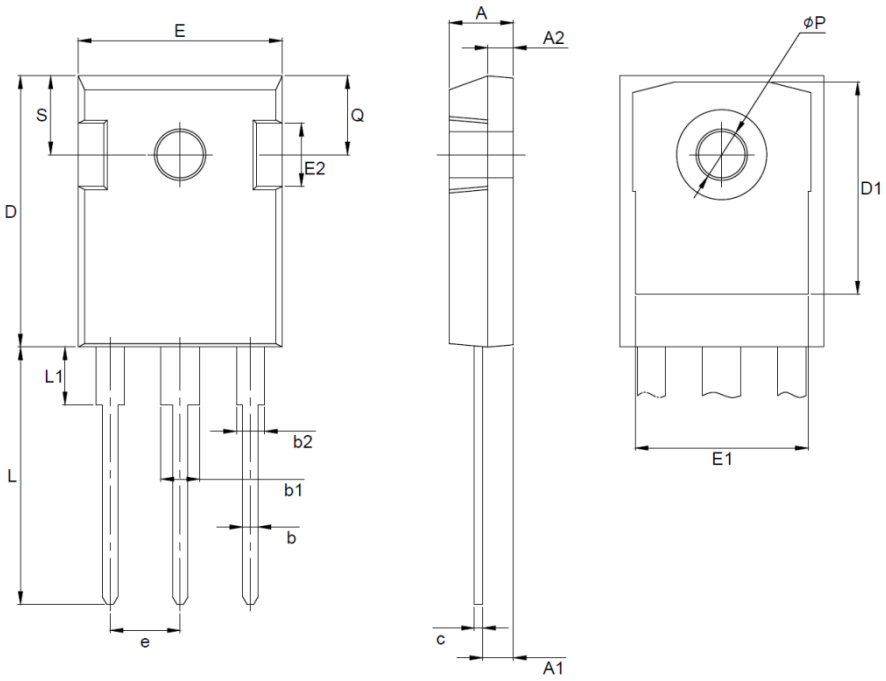


Fig.11 Transient Thermal Response Curve

Package Dimension

TO-247

Dimensions are in millimeters unless otherwise specified



Symbol	Dimension (mm)		
	Min	Nom	Max
A	4.70	–	5.31
A1	2.20	–	2.60
A2	1.50	–	2.49
b	0.99	–	1.40
b1	2.59	–	3.43
b2	1.65	–	2.39
c	0.38	–	0.89
D	20.30	–	21.46
D1	13.08	–	–
E	15.45	–	16.26
E1	13.06	–	14.15
E2	4.32	–	5.49
e	5.45 BSC		
L	19.81	–	20.57
L1	–	–	4.50
ϕP	3.50	–	3.70
Q	5.38	–	6.20
S	6.15 BSC		

Note : Package body size, length and width do not include mold flash, protrusions and gate burrs.

DISCLAIMER:

The Products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any Product can reasonably be expected to result in a personal injury. Seller's customers using or selling Seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.