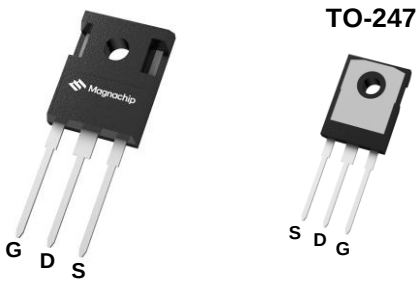
MDQ20N116PTTH

Single N-channel Trench MOSFET 200V 11.6mΩ 95A

FEATURES

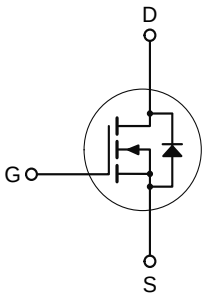
- Trench Power MOSFET technology
- N-channel, normal level
- Enhanced avalanche ruggedness
- 100% UIS and Rg tested
- Maximum 175°C junction temperature



Top View

APPLICATIONS

- DC/DC and AC/DC converters
- Brushed and BLDC Motor drive systems
- Battery powered systems



KEY PERFORMANCE PARAMETERS

V_{DS}	200	V
$R_{DS(on),\ typ.}$	0.0106	Ω
I_D	95	A
$Q_{G,\ typ.}$	83	nC
Junction temperature, max.	175	°C

RoHS Compliant
HALOGEN-FREE

ORDERING INFORMATION

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDQ20N116PTTH	TO-247	MDQ20N116	Tube	Halogen Free

http://www.magnachip.com/

ABSOLUTE MAXIMUM RATINGS, at T_J = 25°C, unless otherwise specified

PARAMETER		SYMBOL	RATING	UNIT
Drain-source Voltage		V_{DS}	200	V
Gate-source Voltage		V_{GS}	± 20	V
Drain current	Tc=25°C	I_D	95	A
	Tc=100°C		67	A
1) Pulsed drain current	Tc=25°C	I_{DM}	380	A
Total power dissipation	Tc=25°C	P_{tot}	300	W
	Tc=100°C		150	W
2) Avalanche energy, single pulse		E_{AS}	365	mJ
Operating and storage temperature		T_j, T_{stg}	- 55 ~ 175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Thermal resistance, junction - case	$R_{\theta JC}$	0.5	°C/W
3) Thermal resistance, junction - ambient	$R_{\theta JA}$	40	°C/W

Notes
1. Pulse width limited by Tjmax
2. Starting TJ=25°C, L=1mH, I_{AS}=27A, V_{DD}=50V, V_{GS}=10V
3. Surface mounted FR-4 board by JEDEC (jesd51-7)

ELECTRICAL CHARACTERISTICS (T_J = 25°C)

Static

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain-source breakdown voltage	$V_{(BR)DSS}$	200	-	-	V	V_{GS}=0 V, I_D=250 μA
Gate threshold voltage	$V_{GS(th)}$	3.00	3.75	4.50	V	V_{DS}=V_{GS}, I_D=250 μA
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	V_{DS}=200 V, V_{GS}=0 V
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	V_{GS}=±20 V, V_{DS}=0 V
Drain-source on-state resistance	$R_{DS(on)}$	-	10.6	11.6	mΩ	V_{GS}=10 V, I_D=50 A
Gate resistance	R_G	-	3.0	-	Ω	f=1MHz
Transconductance	g_{fs}	-	90	-	S	V_{DS}=10 V, I_D=50 A

Dynamic

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Input capacitance	C_{iss}	-	6869	-	pF	V_{GS}=0 V, V_{DS}=100 V, f=1 MHz
Output capacitance	C_{oss}	-	402	-	pF	V_{GS}=0 V, V_{DS}=100 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	-	8	-	pF	V_{GS}=0 V, V_{DS}=100 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	37	-	ns	V_{DD}=100 V, V_{GS}=10 V, ID=50 A, $R_{G,ext}$=3Ω
Rise time	t_r	-	12	-	ns	V_{DD}=100 V, V_{GS}=10 V, ID=50 A, $R_{G,ext}$=3Ω
Turn-off delay time	$t_{d(off)}$	-	62	-	ns	V_{DD}=100 V, V_{GS}=10 V, ID=50 A, $R_{G,ext}$=3Ω
Fall time	t_f	-	8	-	ns	V_{DD}=100 V, V_{GS}=10 V, ID=50 A, $R_{G,ext}$=3Ω

Gate charge characteristics

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Gate to source charge	Q_{gs}	-	39	-	nC	V_{DD}=100 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge at threshold	$Q_{gs(th)}$	-	22	-	nC	V_{DD}=100 V, I_D=50 A, V_{GS}=0 to 10 V
Gate to drain charge	Q_{gd}	-	12	-	nC	V_{DD}=100 V, I_D=50 A, V_{GS}=0 to 10 V
Switching charge	Q_{sw}	-	29	-	nC	V_{DD}=100 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge total	Q_g	-	83	-	nC	V_{DD}=100 V, I_D=50 A, V_{GS}=0 to 10 V
Gate plateau voltage	$V_{plateau}$	-	5.9	-	V	V_{DD}=100 V, I_D=50 A, V_{GS}=0 to 10 V

Source-Drain Diode Ratings and Characteristics

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode continous forward current	I_S	-	-	95	A	-
Diode pulse current	$I_{S,pulse}$	-	-	380	A	pulsed; tp ≤ 10 μs
Diode forward voltage	V_{SD}	-	0.9	1.2	V	V_{GS}=0 V, I_F=50 A
Reverse recovery time	t_{rr}	-	167	-	ns	I_F=50 A, d_{iF}/dt=100 A/μs
Reverse recovery charge	Q_{rr}	-	1010	-	nC	I_F=50 A, d_{iF}/dt=100 A/μs

Electrical Characteristics Diagrams (25 ℃, unless otherwise noted)

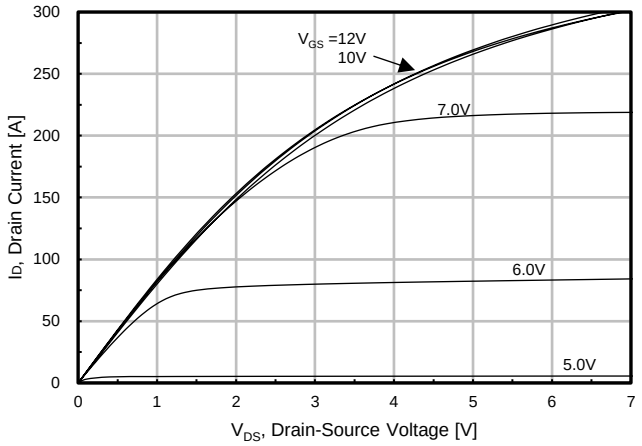


Fig. 1. Output Characteristics (25℃)

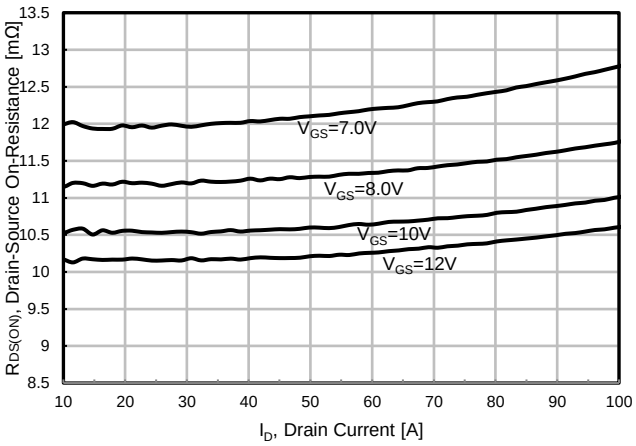


Fig. 2. Static On-Resistance Variation

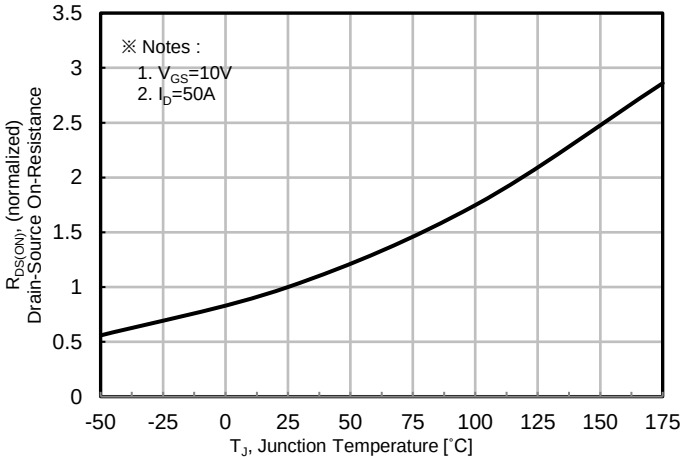


Fig. 3. On-Resistance vs. Junction Temperature

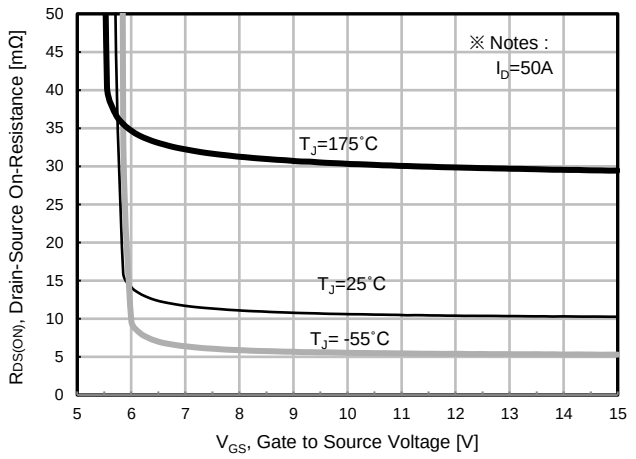


Fig. 4. On-Resistance vs. Gate to source Voltage

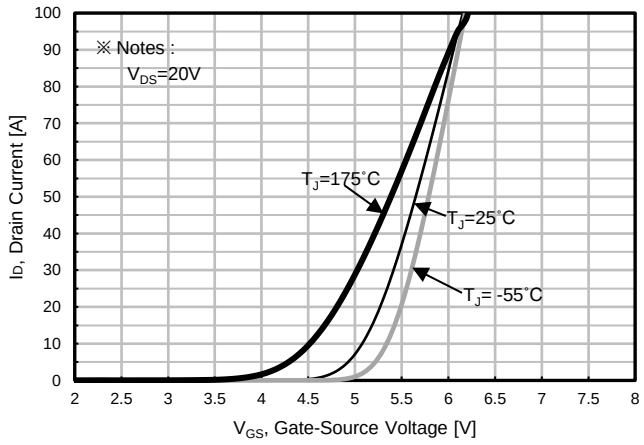


Fig. 5. Transfer Characteristics

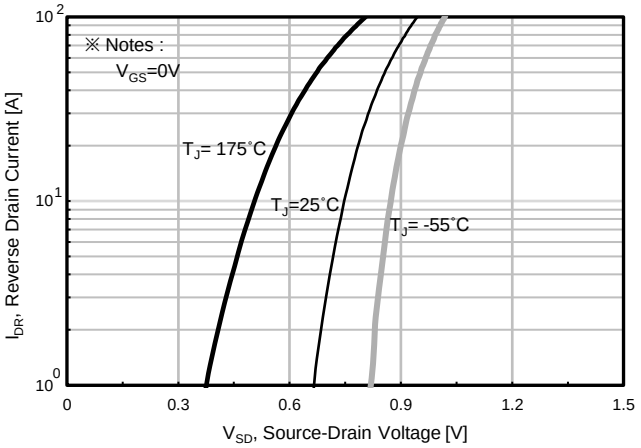


Fig. 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Electrical Characteristics Diagrams (25 ℃, unless otherwise noted)

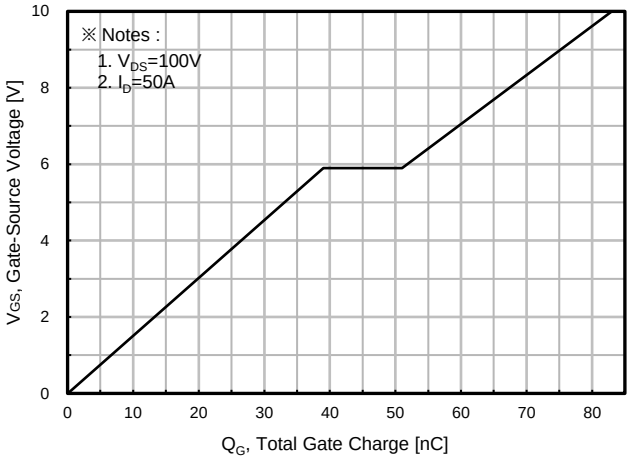


Fig. 7. Gate Charge

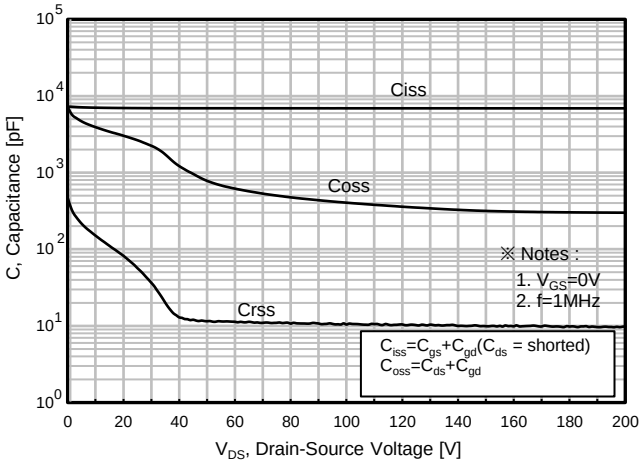


Fig. 8. Capacitance

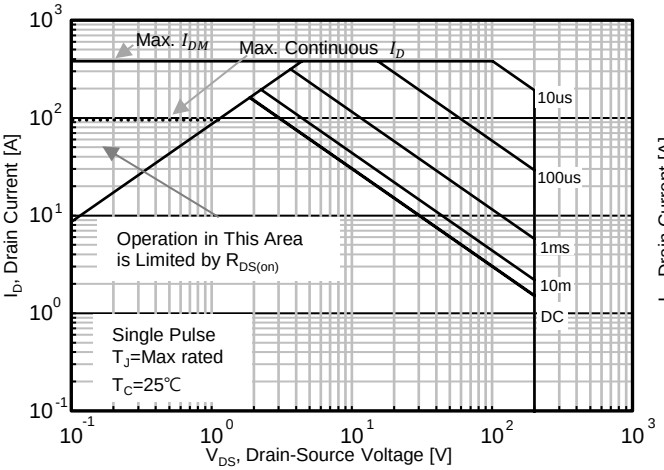


Fig. 9. Safe Operating Area, Junction-to-Ambient

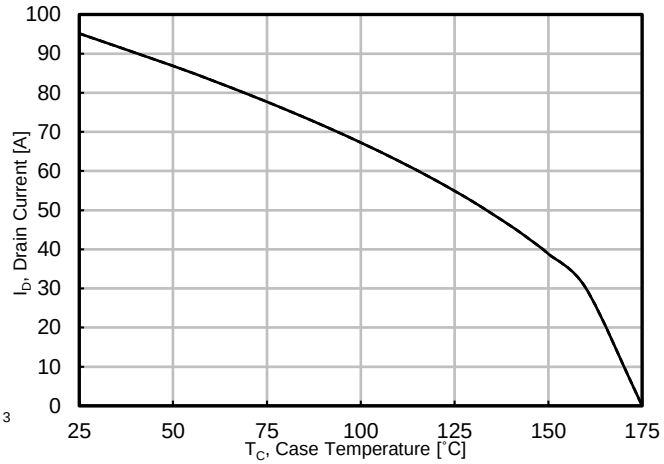


Fig. 10. Maximum Drain vs. Case Temperature

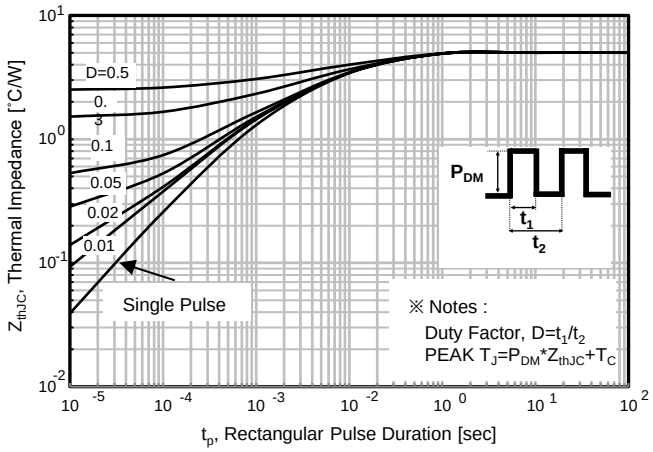


Fig. 11. Transient Thermal Impedance Junction to Case (Rthjc)

Electrical Characteristics Diagrams (25 ℃, unless otherwise noted)

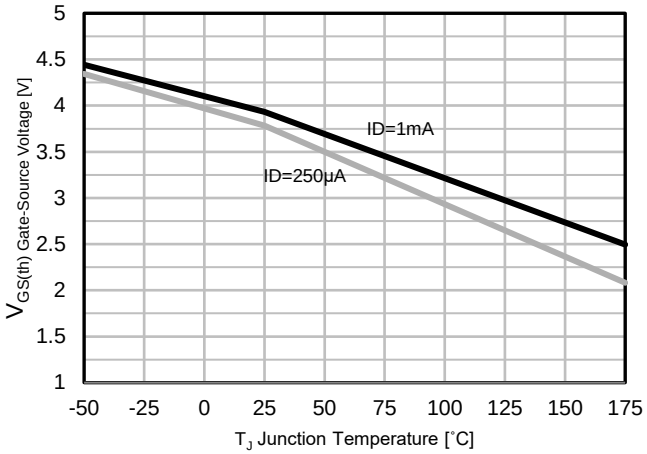


Fig.12 Gate -Source Threshold Voltage vs. Temperature

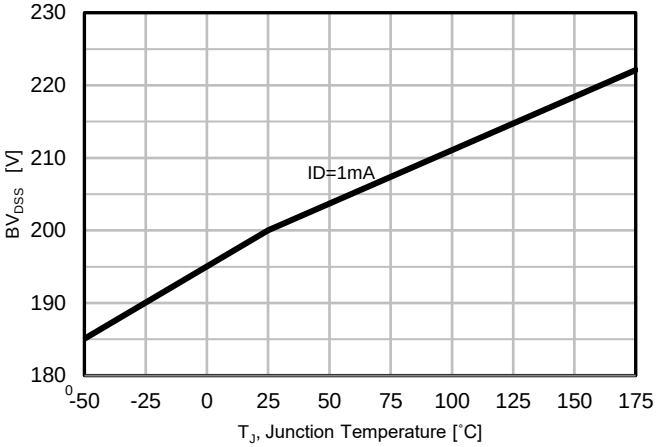
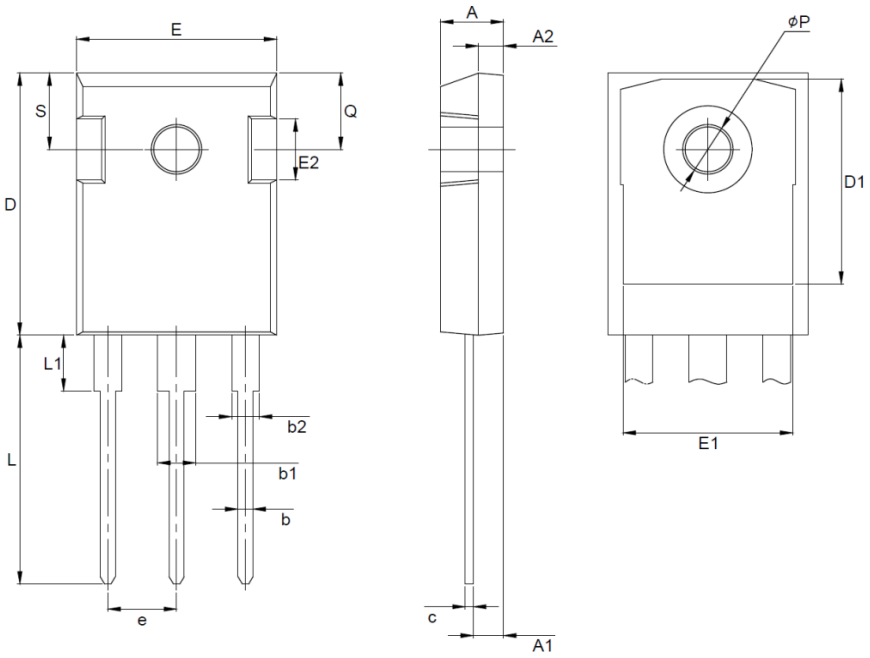


Fig.13 Drain-Source Voltage vs. Temperature

Package Information

TO-247



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		

Notes

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.