



MDP20N116PTTH

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

FEATURES

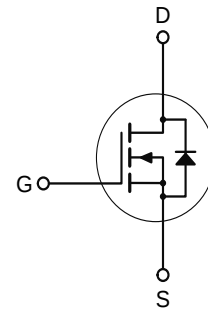
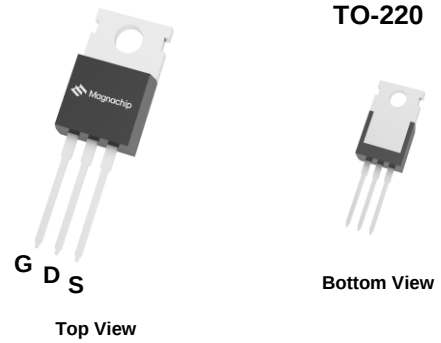
- MV MOSFET GEN3T technology
- N-channel, normal level
- Enhanced avalanche ruggedness
- 100% UIS and Rg tested
- Maximum 175°C junction temperature

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	$^{\circ}\text{C}$



RoHS Compliant
HALOGEN-FREE

ORDERING INFORMATION

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDP20N116PTTH	TO-220	MDP20N116	Tube	Halogen Free

<http://www.magnachip.com/>

ABSOLUTE MAXIMUM RATINGS, at $T_J = 25^\circ\text{C}$, unless otherwise specified

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

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Thermal resistance, junction - case	$R_{\theta JC}$	0.5	$^\circ\text{C/W}$
³⁾ Thermal resistance, junction - ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

Notes

- Pulse width limited by T_{jmax}
- Starting $T_J=25^\circ\text{C}$, $L=1\text{mH}$, $I_{AS}=27\text{A}$, $V_{DS}=50\text{V}$, $V_{GS}=10\text{V}$
- Surface mounted FR-4 board by JEDEC (jesd51-7)

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}\text{C}$)**Static**

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

Dynamic

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

Gate charge characteristics

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

Source-Drain Diode Ratings and Characteristics

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode continuous forward current	I_S	-	-	95	A	-
Diode pulse current	$I_{S,pulse}$	-	-	380	A	pulsed; $t_p \leq 10\text{ }\mu\text{s}$
Diode forward voltage	V_{SD}	-	0.9	1.2	V	$V_{GS}=0\text{ V}$, $I_F=50\text{ A}$
Reverse recovery time	t_{rr}	-	167	-	ns	$I_F=50\text{ A}$, $dI_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}	-	1010	-	nC	$I_F=50\text{ A}$, $dI_F/dt=100\text{ A}/\mu\text{s}$

Electrical Characteristics Diagrams (25 °C, unless otherwise noted)

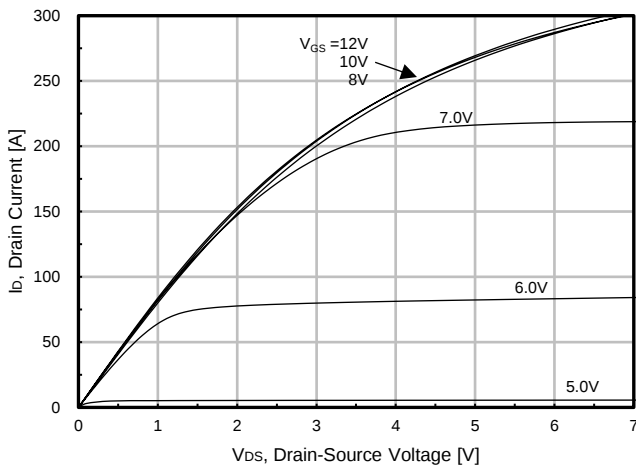


Fig. 1. Output Characteristics (25°C)

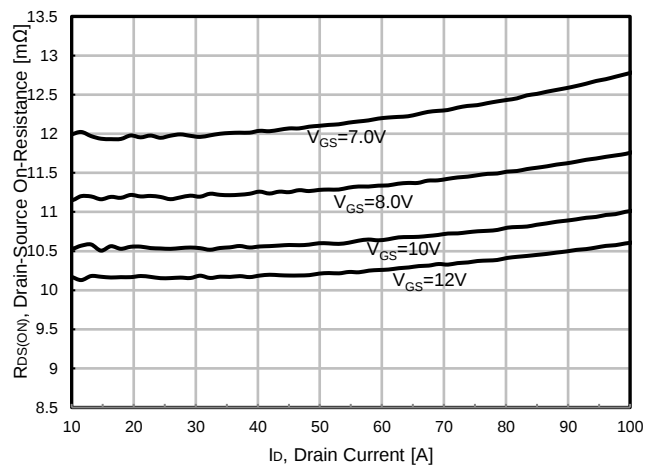


Fig. 2. Static On-Resistance Variation

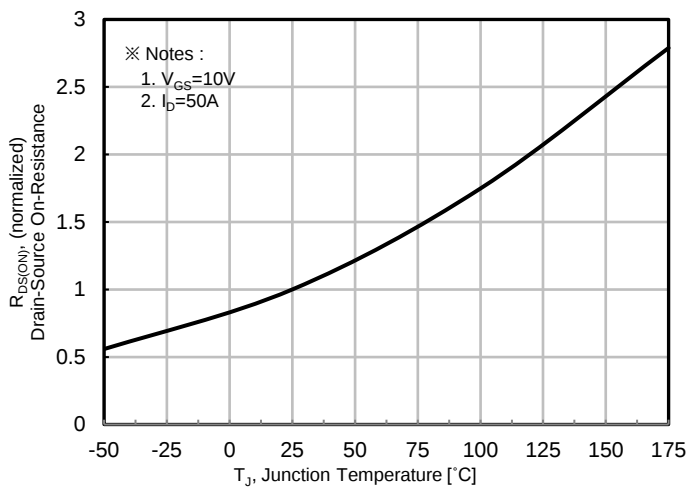


Fig. 3. On-Resistance vs. Junction Temperature

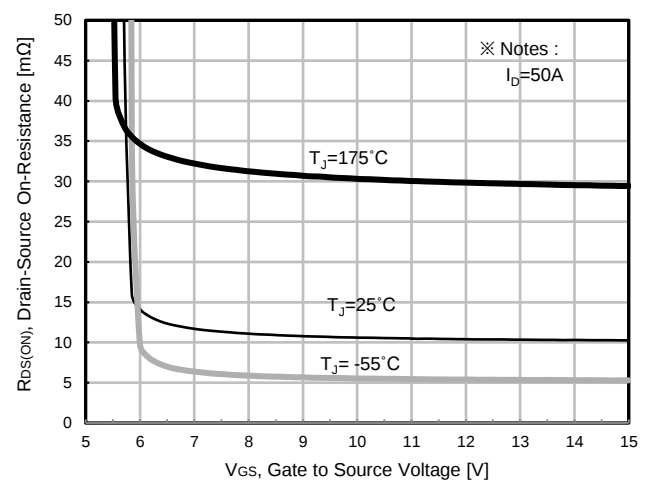


Fig. 4. On-Resistance vs. Gate to source Voltage

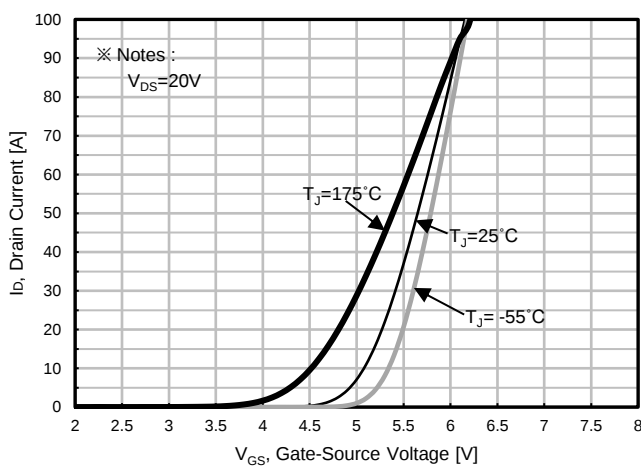


Fig. 5. Transfer Characteristics

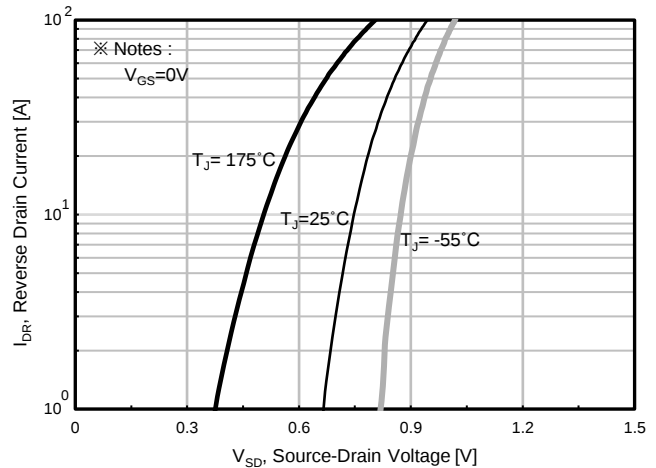


Fig. 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Electrical Characteristics Diagrams (25 °C, unless otherwise noted)

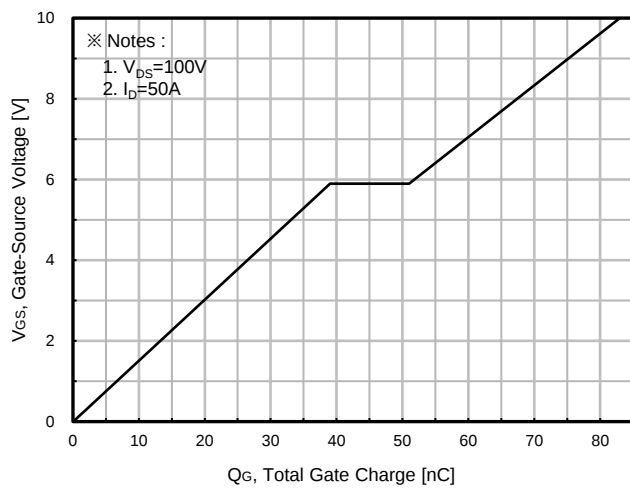


Fig. 7. Gate Charge

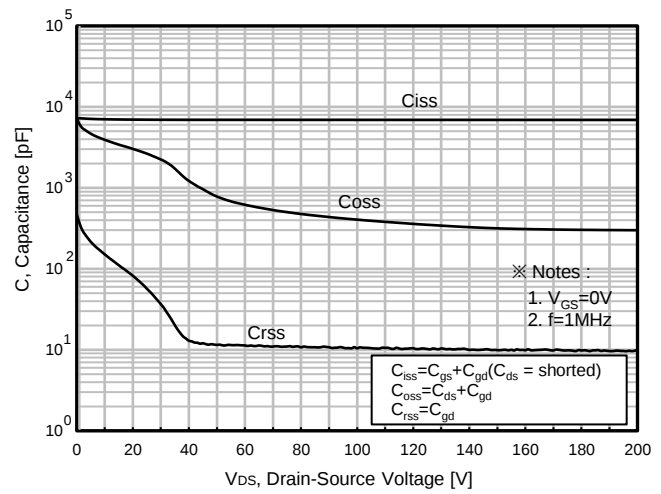


Fig. 8. Capacitance

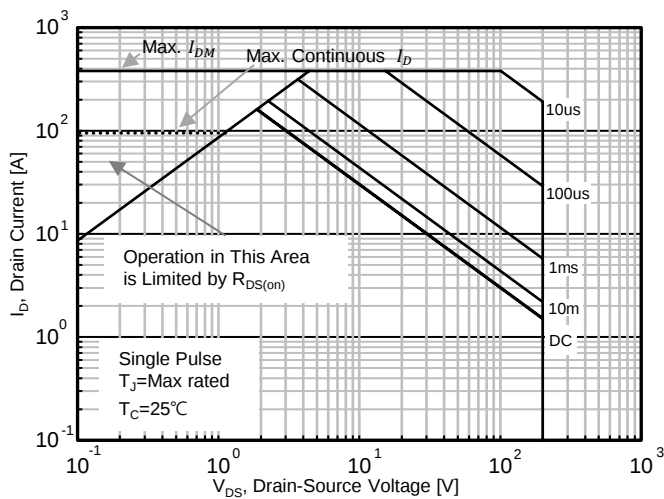


Fig. 9. Safe Operating Area, Junction-to-Ambient

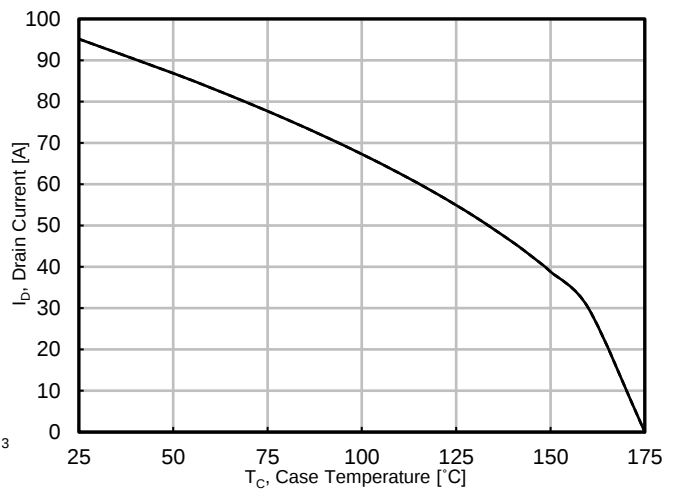
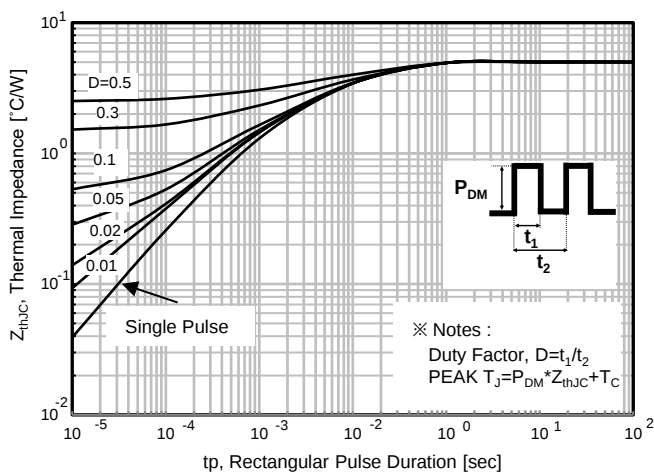


Fig. 10. Maximum Drain vs. Case Temperature

Fig. 11. Transient Thermal Impedance Junction to Case (R_{thjc})

Electrical Characteristics Diagrams (25 °C, unless otherwise noted)

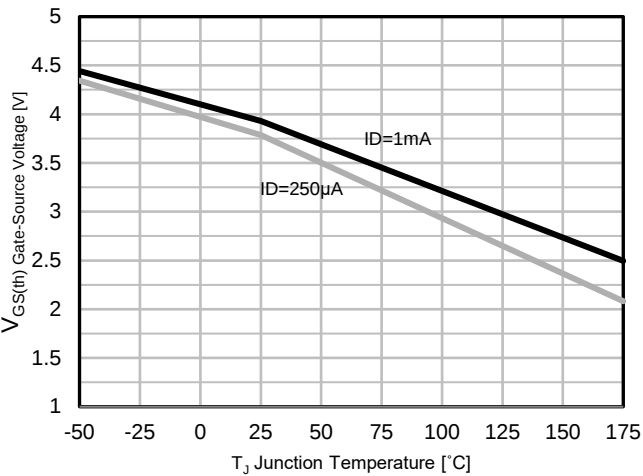


Fig.12 Gate -Source Threshold Voltage vs. Temperature

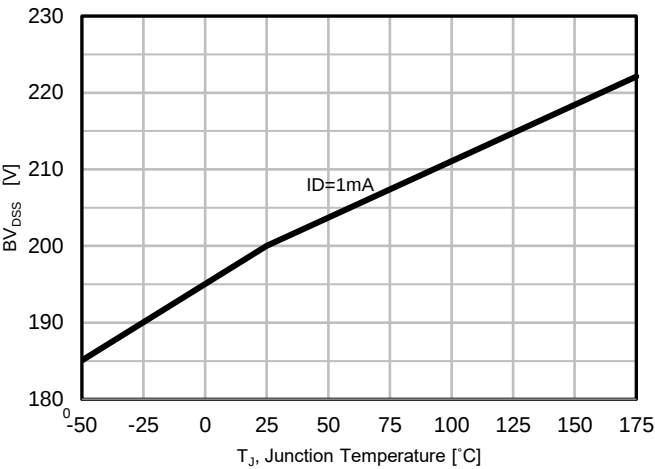
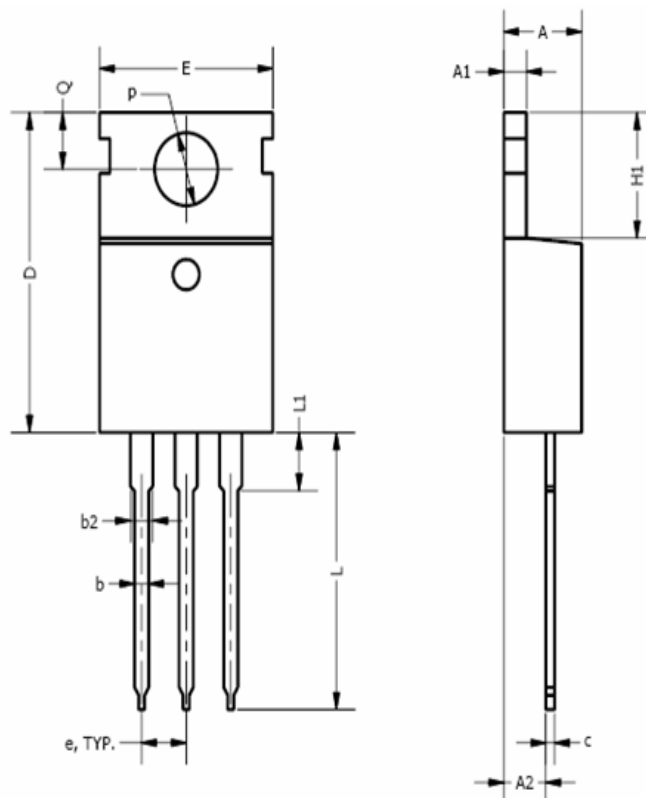


Fig.13 Drain-Source Voltage vs. Temperature

Package Information

TO-220



Symbol	Min	Nom	Max
A	3.56		4.83
A1	0.50		1.40
A2	2.03		2.92
b	0.38	0.69	1.02
b2	1.14	1.45	1.78
c	0.36		0.61
D	14.22		16.51
e	2.54 TYP		
E	9.65		10.67
H1	5.84		6.86
L	12.70		14.73
L1			6.35
ϕP	3.53		4.09
Q	2.54		3.43

Notes

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

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