



MDY20N113PTRH

Single N-channel Trench MOSFET 200V 11.3mΩ 100A

FEATURES

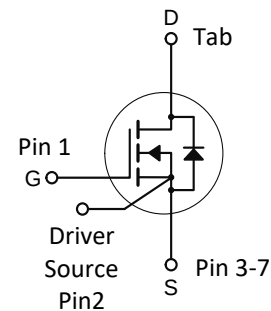
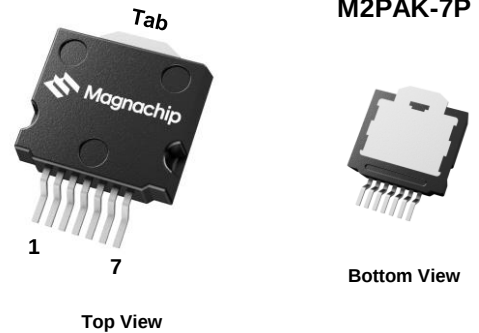
- MV MOSFET GEN3T technology
- N-channel, normal level
- Enhanced avalanche ruggedness
- 100% UIS and Rg tested
- Maximum 175°C junction temperature

APPLICATIONS

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

KEY PERFORMANCE PARAMETERS

V_{DS}	200	V
$R_{DS(on), typ.}$	0.0103	Ω
I_D	100	A
Q_G	83	nC
Junction temperature, max	175	°C



ORDERING INFORMATION

Type / Ordering Code	Package	Marking	Packing	RoHS Status
MDY20N113PTRH	M2PAK-7P	MDY20N113	Tape & Reel	Halogen Free

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

ABSOLUTE MAXIMUM RATINGS, at $T_C = 25^\circ\text{C}$, 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	100	A
	$T_C=100^\circ\text{C}$		71	A
¹⁾ Pulsed drain current	$T_C=25^\circ\text{C}$	I_{DM}	400	A
Total power dissipation	$T_C=25^\circ\text{C}$	P_{tot}	326	W
	$T_C=100^\circ\text{C}$		163	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	$R_{\theta JC}$	0.46	$^\circ\text{C/W}$
³⁾ Thermal resistance, junction - ambient	$R_{\theta JA}$	30	$^\circ\text{C/W}$

Notes

1. Pulse width limited by T_{jmax}
2. Starting $T_J=25^\circ\text{C}$, $L=1\text{mH}$, $I_{AS}=27\text{A}$, $V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$
3. 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	$R_{DS(on)}$	-	10.3	11.3	m Ω	$V_{GS}=10\text{ V}$, $I_D=50\text{ A}$
Gate resistance	R_G	-	2.5	-	Ω	f=1MHz
Transconductance	g_{fs}	-	85	-	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	-	-	100	A	-
Diode pulse current	$I_{S,pulse}$	-	-	402	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)

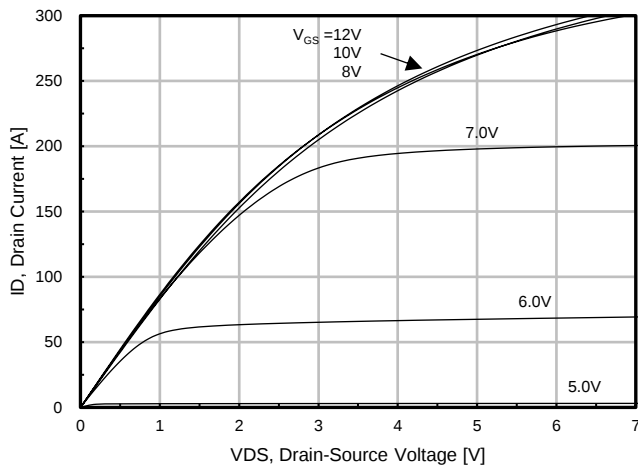


Fig. 1. Output Characteristics

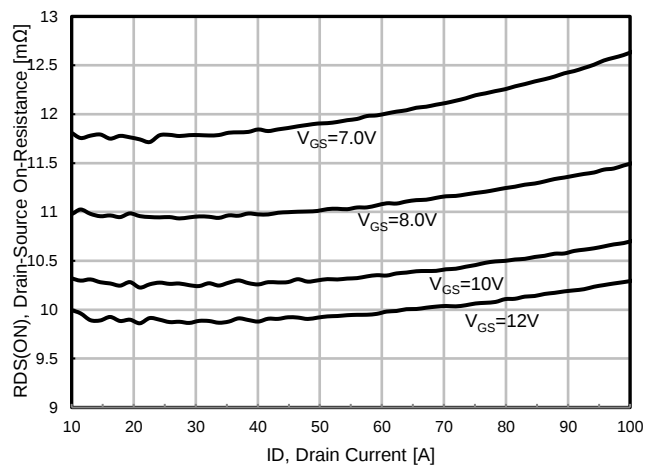


Fig. 2. Static On-Resistance Variation

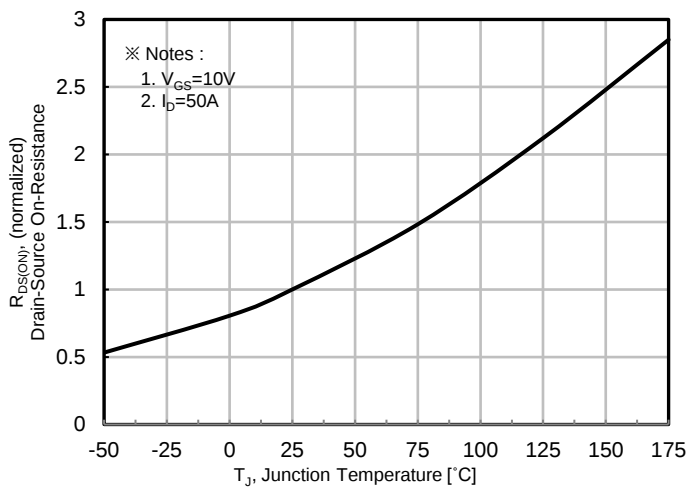


Fig. 3. On-Resistance vs. Junction Temperature

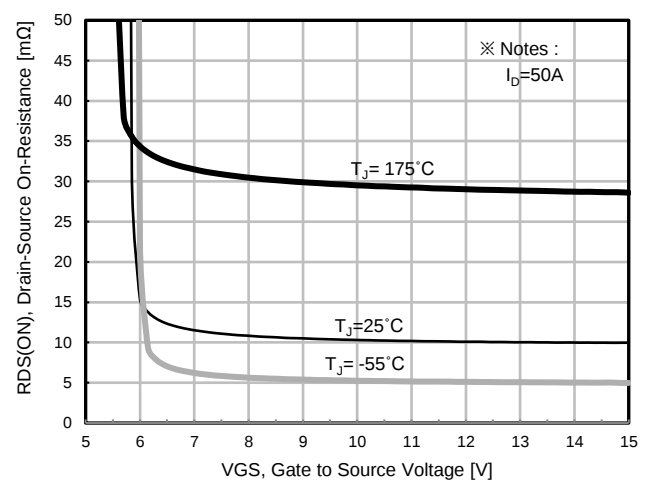


Fig. 4. On-Resistance vs. Gate to source Voltage

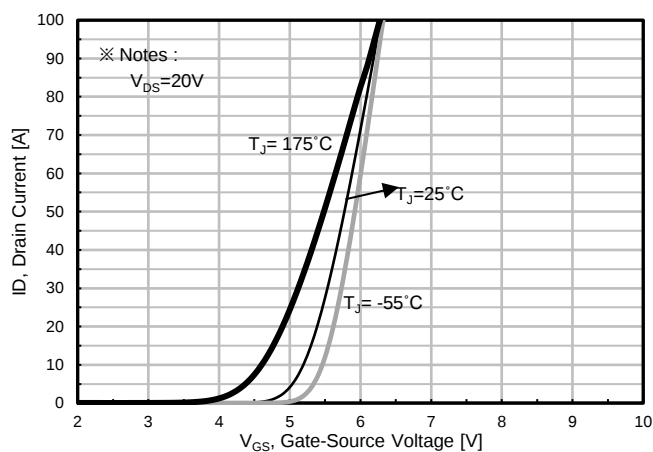


Fig. 5. Transfer Characteristics

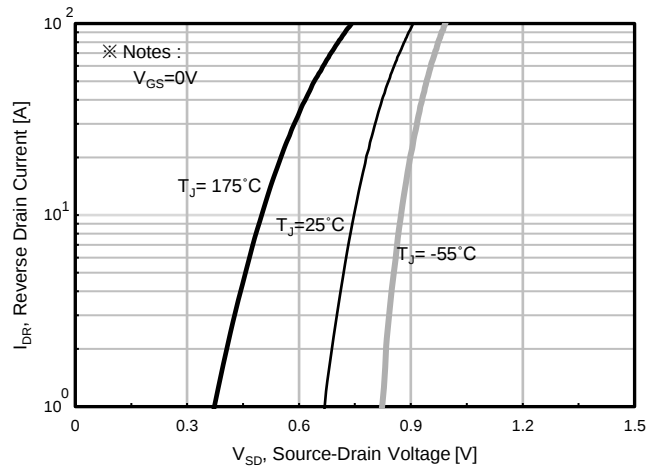


Fig. 6. Body Diode Forward Voltage Variation with Source Current and Temperature

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

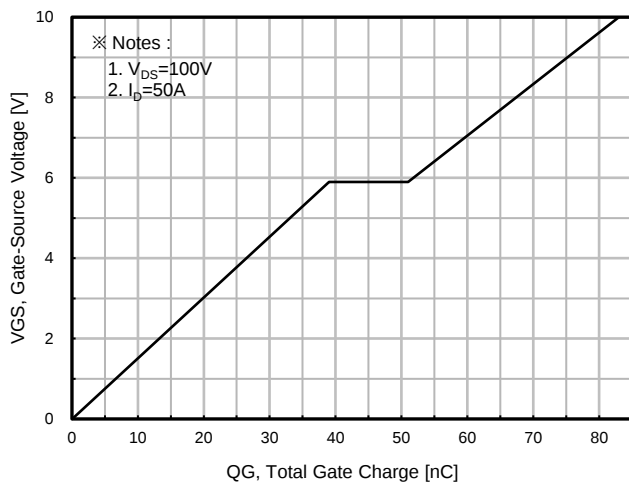


Fig. 7. Gate Charge

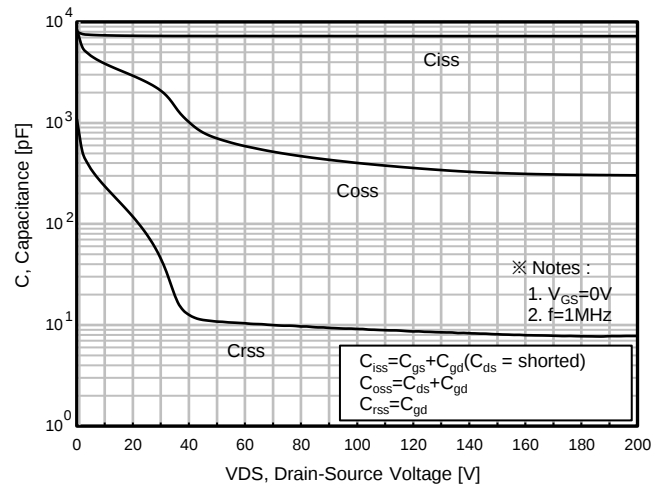


Fig. 8. Capacitance

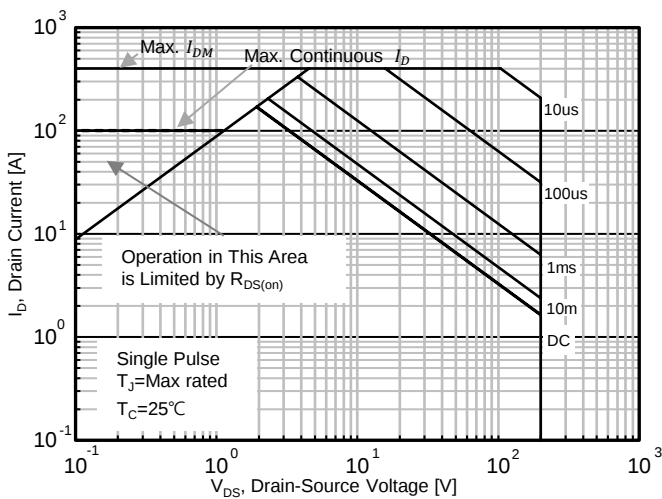


Fig. 9. Safe Operating Area, Junction-to-Ambient

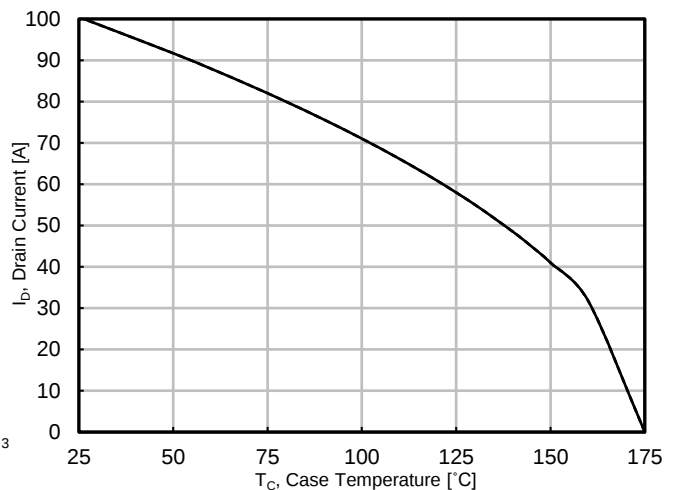


Fig. 10. Maximum Drain vs. Case Temperature

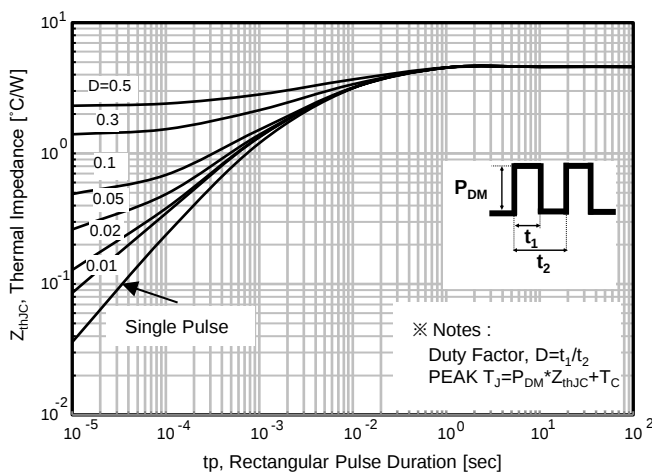


Fig. 11. Transient Thermal Impedance (Junction to Case)

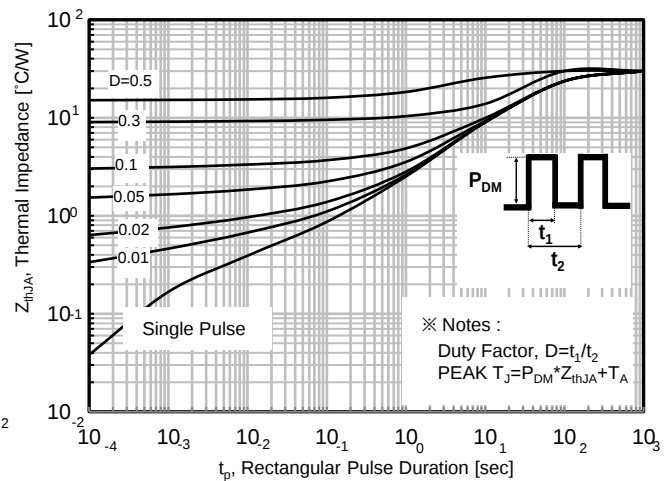


Fig. 11-1. Transient Thermal Impedance (Junction to Ambient)

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

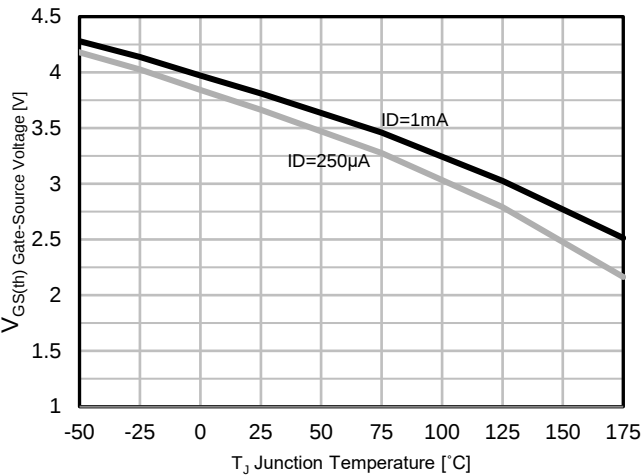


Fig.12 Gate -Source Threshold Voltage vs. Temperature

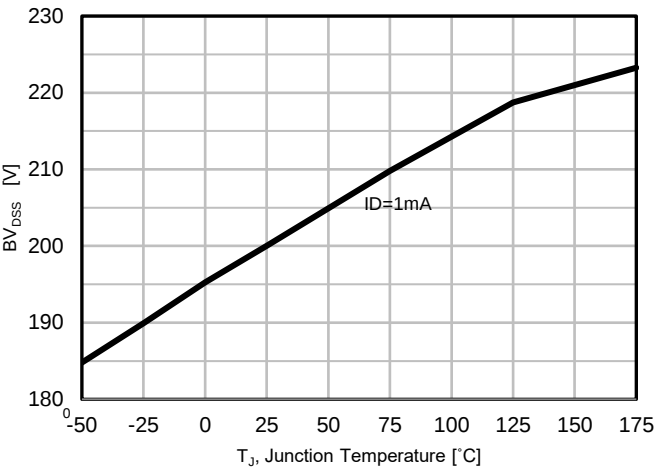
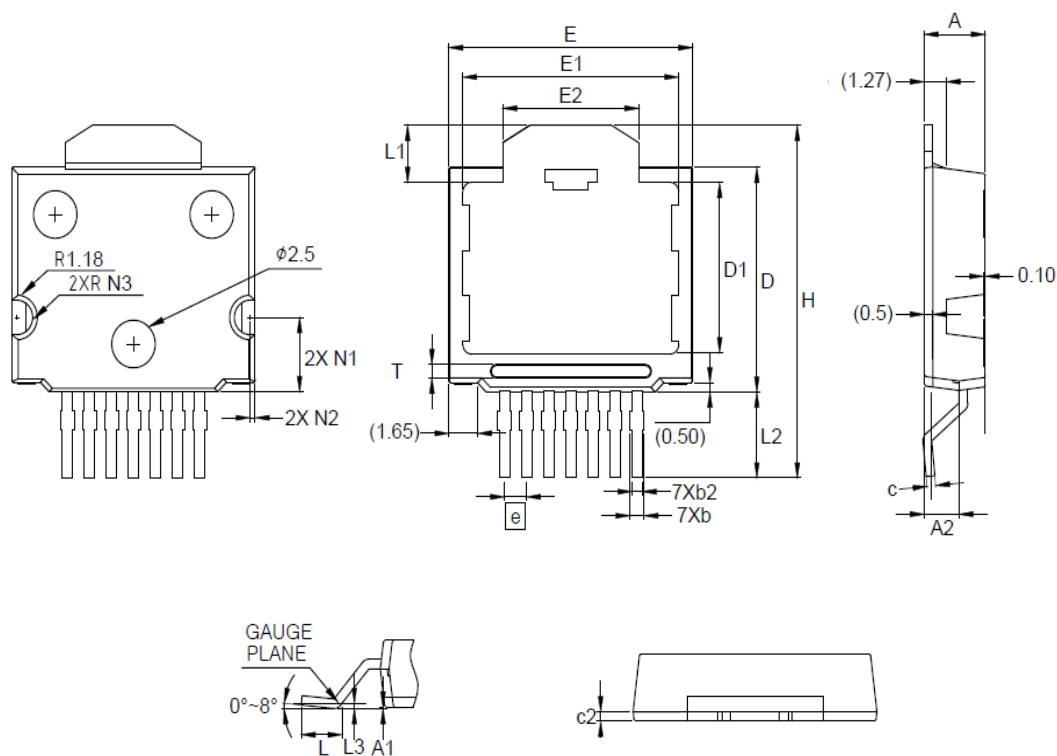


Fig.13 Drain-Source Voltage vs. Temperature

Package Information

M2PAK-7P



Symbol	Dimension (mm)		
	Min	Nom	Max
A	3,40	–	3,60
A1	0,00	–	0,25
A2	1,80	–	2,20
b	0,50	–	0,70
b2	0,50	–	1,00
c	0,40	–	0,60
c2	0,40	–	0,60
D	11,70	–	11,90
D1	8,90	–	9,10
E	13,90	–	14,10
E1	12,30	–	12,50
E2	7,75	–	7,85
T	0,60		0,70
e	BSC 1,27		
H	18,00	–	19,00
L	2,22	–	2,42
L1	2,90	–	3,10
L2	4,35	–	4,65
L3	BSC 0,25		
N1	3,80	–	4,00
N2	0,25	–	0,35
N3	0,80	–	1,00

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

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