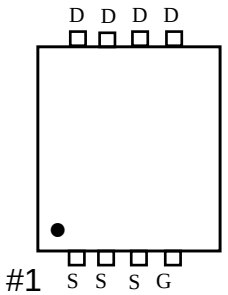
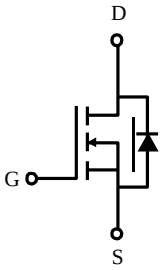
# N-Channel High Density Trench MOSFET

## Features:

- Super high dense cell trench design for low $R_{DS(on)}$.
- Rugged and reliable.
- Surface Mount package.

PDFN5x6




PRODUCT SUMMARY

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | $I_D$ |
|---|---|---|
| 100V | 8mΩ | 68A |

## ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C unless otherwise noted)

| PARAME TERS TEST CONDITIONS | | SYMBOL | LIMITS | UNITS |
|---|---|---|---|---|
| Gata-Source voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain current | $T_A$ = 25℃ | $I_D$ | 68 | A |
| | $T_A$ = 100 ℃ | | 54 | |
| Puised Drain Current[1] | | $I_{DM}$ | 240 | |
| Avalanche Current | | $I_{AS}$ | 23 | |
| Avalanche Energy | L=0.1mH | $E_{AS}$ | 26 | mJ |
| Power Dissipation | $T_A$ = 25 ℃ | $P_D$ | 83 | W |
| | $T_A$ = 100 ℃ | | 58 | |
| Operaing junction & Storege Temperature Range | | $T_s$,$T_{stg}$ | -55 to 150 | ℃ |

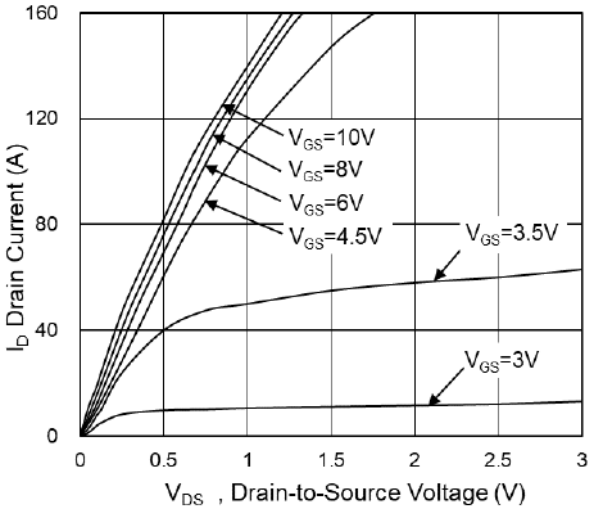
## THERMAL CHARACTERISTICS

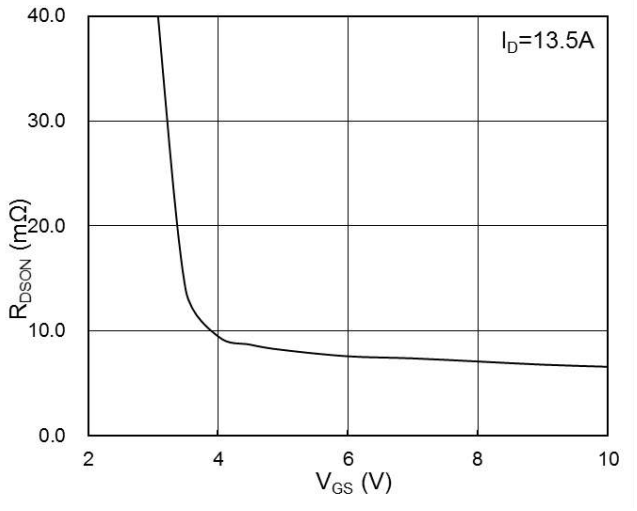
| THERMAL RESISTANCE | SYMBOL | TYPICAL | MAXIMUM | UNITS |
|---|---|---|---|---|
| Junction-to-Case | $R_{\theta JC}$ | | 1.8 | ℃/W |
| Junction-to-Ambient | $R_{\theta JA}$ | | 55 | ℃/W |

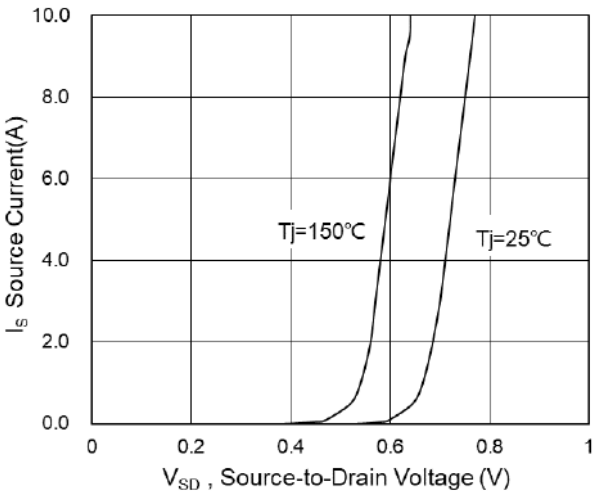
## ELECTRICAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted)

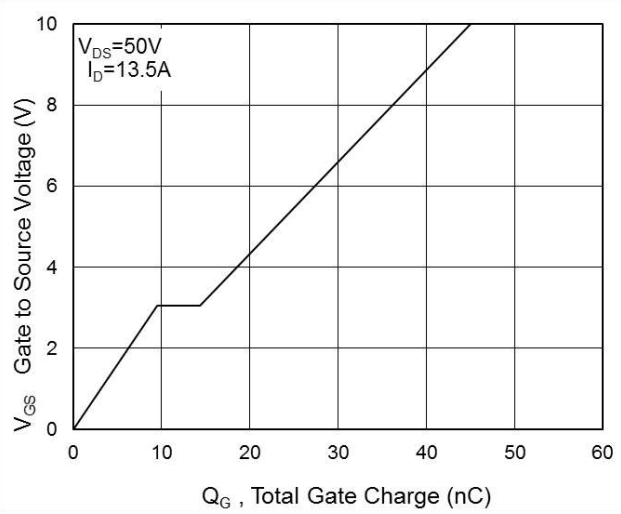
| PARAMETER | SYNBOL | TEST CONDITIONS | LIMITS MIN | LIMITS TYP | LIMITS MAX | UNIT |
|---|---|---|---|---|---|---|
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltege | $V_{(BR)DSS}$ | $V_{GS}$=0V,$I_D$=250μA | 100 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1.2 | 1.6 | 2.3 | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$=0V,$V_{GS}$=± 20V | | | ±100 | nA |
| Zero Gate Voltage Dain Current | $I_{DSS}$ | $V_{DS}$=80V,$V_{GS}$=0 V | | | 1 | μA |
| | | $V_{DS}$=80V,$V_{GS}$=0V,$T_J$=125 ℃ | | | 30 | |
| Drain-Source On- State Resistance[1] | $R_{DS(ON)}$ | $V_{GS}$=10V,$I_D$=13.5A | | 6.6 | 8 | mΩ |
| | | $V_{GS}$=4.5V,$I_D$=11.5A | | 8.7 | 10.5 | |
| Forward Trans conductance[1] | $g_{fs}$ | $V_{DS}$=5V,$I_D$=20A | | 85 | | S |
| **DYNAMIC** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V,$V_{DS}$=50V,f=1MHz | | 3320 | | pF |
| Output Capacitance | $C_{oss}$ | | | 605 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 20 | | |
| Gate Resistance | $R_G$ | $V_{GS}$=0V,f=1MHz | | 3 | | Ω |
| Total Gate Charge[2] | $Q_{g(vgs=10V)}$ | $V_{DS}$=50V (BR)DSS, $I_D$ = 13.5A | | 45 | | nC |
| | $Q_{g(vgs=4.5V)}$ | | | 19.3 | | |
| Gate Source Charge[2] | $Q_{gS(VGS=10V)}$ | | | 9.5 | | |
| | $Q_{gS(VGS=4.5V)}$ | | | 6.5 | | |
| Gate-Drain Charge[2] | $Q_{gd(VGS=10V)}$ | | | 4.8 | | |
| | $Q_{gd(VGS=4.5V)}$ | | | 2.7 | | |
| Tum-On Delay Time[2] | $t_{d(on)}$ | $V_{DS}$=50V,$R_L$=1.5Ω $I_D$ =13.5A,$V_{GS}$=10V.$R_{GS}$=3Ω | | 10 | | nS |
| Rise Time[2] | $t_r$ | | | 6.5 | | |
| Tum-Off Delay Time[2] | $t_{d(off)}$ | | | 45 | | |
| Fall Time[2] | $t_r$ | | | 7.5 | | |
| **SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS($T_J$=25℃)** | | | | | | |
| Continuous Current | $I_S$ | | | 45 | | A |
| Forward Voltage[1] | $V_{SD}$ | $I_F$=$I_S$,$V_{GS}$=0V | | 0.75 | 1.1 | V |
| Reverse Recovery Time | $T_{rr}$ | $I_F$=13.5A,$d_{1f}/d_t$=100A/μs | | 33 | | nS |
| Reverse Recovery Charge | $Q_{rr}$ | | | 150 | | nC |

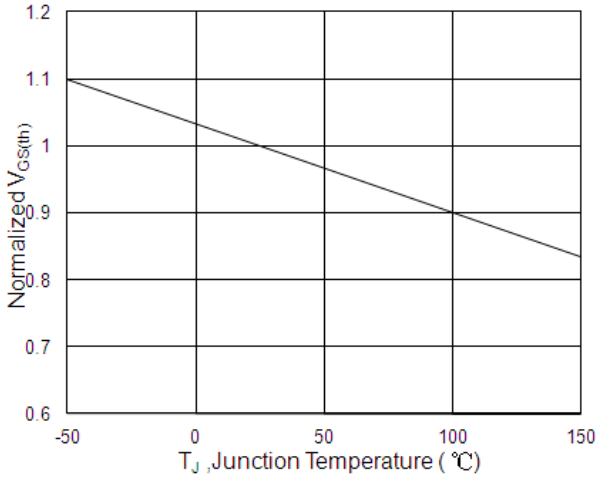
Note
b. Pulse Test Pulse width ≤ 300usec , Duty Cycle ≤ 2% .
c. Independent of operating production testing .

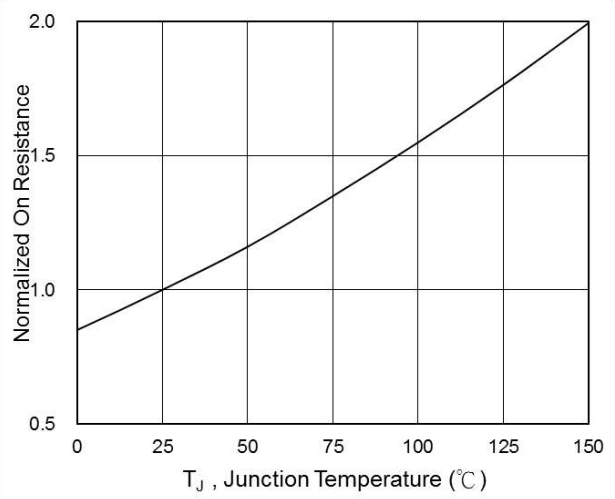

160
120
80
40
0
$I_D$ Drain Current (A)
$V_{GS}$=10V
$V_{GS}$=8V
$V_{GS}$=6V
$V_{GS}$=4.5V
$V_{GS}$=3.5V
$V_{GS}$=3V
0
0.5
1
1.5
2
2.5
3
$V_{DS}$ , Drain-to-Source Voltage (V)

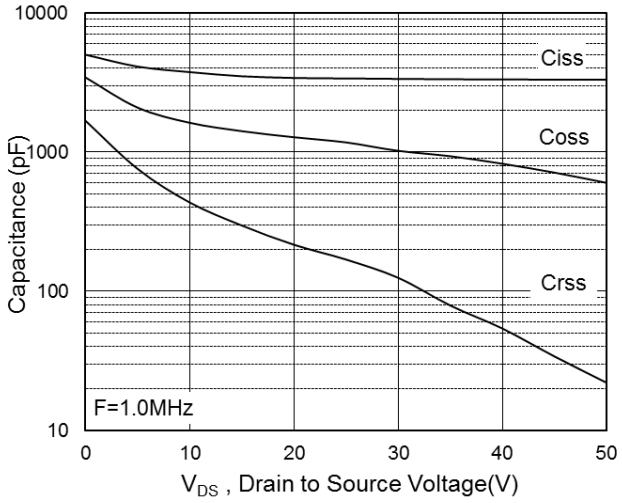

40.0
30.0
20.0
10.0
0.0
$R_{DSON}$ (mΩ)
$I_D$=13.5A
2
4
6
8
10
$V_{GS}$ (V)

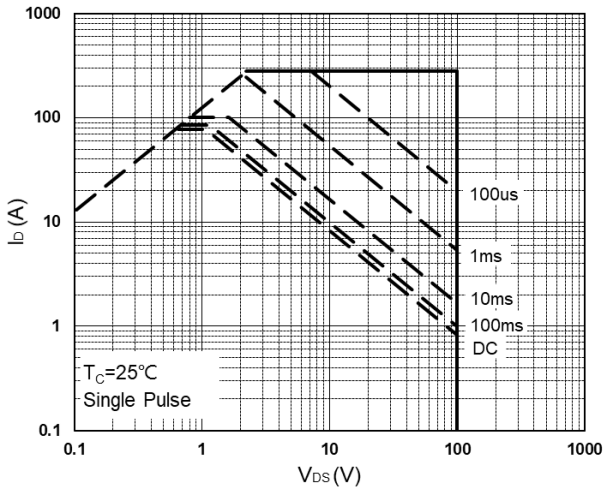

10.0
8.0
6.0
4.0
2.0
0.0
$I_S$ Source Current(A)
Tj=150℃
Tj=25℃
0
0.2
0.4
0.6
0.8
1
$V_{SD}$ , Source-to-Drain Voltage (V)

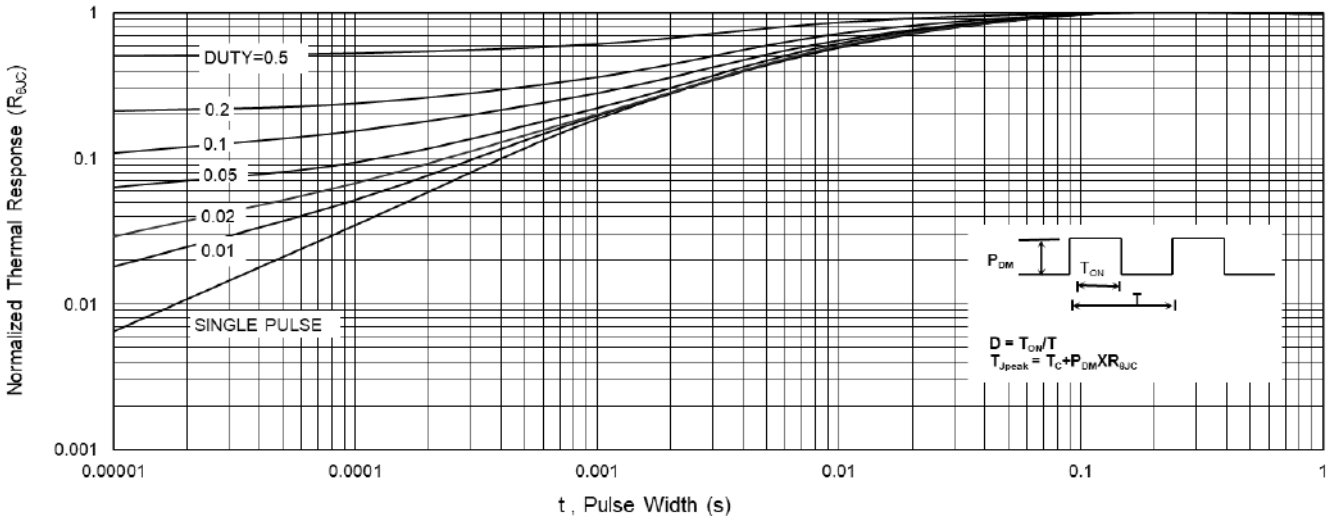

10
8
6
4
2
0
$V_{GS}$ Gate to Source Voltage (V)
$V_{DS}$=50V
$I_D$=13.5A
0
10
20
30
40
50
60
$Q_G$ , Total Gate Charge (nC)


1.2
1.1
1
0.9
0.8
0.7
0.6
Normalized $V_{GS(th)}$
-50
0
50
100
150
$T_J$ ,Junction Temperature ( ℃)


2.0
1.5
1.0
0.5
Normalized On Resistance
0
25
50
75
100
125
150
$T_J$ , Junction Temperature (℃)


10000
1000
100
10
Capacitance (pF)
Ciss
Coss
Crss
F=1.0MHz
0
10
20
30
40
50
VDS , Drain to Source Voltage(V)


1000
100
10
1
0.1
ID (A)
100us
1ms
10ms
100ms
DC
TC=25°C
Single Pulse
0.1
1
10
100
1000
VDS (V)


1
0.1
0.01
0.001
Normalized Thermal Response (RθJC)
DUTY=0.5
0.2
0.1
0.05
0.02
0.01
SINGLE PULSE
PDM
TON
T
D = TON/T
TJpeak = TC+PDMXRθJC
0.00001
0.0001
0.001
0.01
0.1
1
t , Pulse Width (s)