

N-Channel 40V(D-S) MOSFET

| Product summary | | |
|---------------------------------------|------|------------|
| V_{DS} | 40 | V |
| $R_{DS(ON)}$ (at $V_{GS}=10V$) Typ. | 6.9 | m Ω |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$) Typ. | 10.5 | m Ω |
| I_D ($T_C=25^{\circ}C$) | 50 | A |

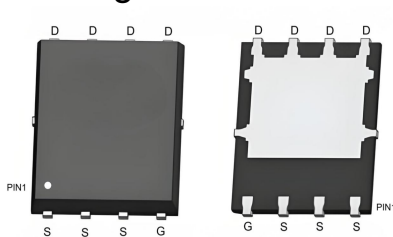
Features

- High density cell design for low $R_{DS(ON)}$
- Single Drive Requirement
- Fast Switching Characteristic

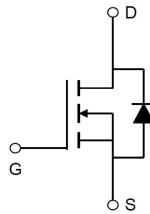
Applications

- Load Switch
- Hand-Held Device

Pin Configuration



PDFN5X6-8L



Packing Information

| Device | Package | Reel Size | Quantity(Min. Package) |
|------------|------------|-----------|------------------------|
| ECAP50N04S | PDFN5X6-8L | 13" | 3000pcs |

Absolute Maximum Ratings (at $T_A=25^{\circ}C$ Unless Otherwise Noted)

| Symbol | Parameter | | Rating | Units |
|----------------|--|--------------------|-------------|-------------|
| V_{DS} | Drain-Source Voltage | | 40 | V |
| V_{GS} | Gate-Source Voltage | | ± 20 | V |
| I_D | Continuous Drain Current ^A | $T_C=25^{\circ}C$ | 50 | A |
| | | $T_C=100^{\circ}C$ | 32 | A |
| I_{DM} | Pulse Drain Current Tested ^B | | 170 | A |
| E_{AS} | Single Pulse Avalanche Energy ^C | | 48 | mJ |
| P_D | Power Dissipation ^D | | 52 | W |
| T_J, T_{STG} | Junction and Storage Temperature Range | | -55 to +150 | $^{\circ}C$ |

Thermal Characteristics

| Symbol | Parameter | Typical | Units |
|-----------------|---|---------|---------------|
| $R_{\theta JA}$ | Thermal Resistance-Junction to ambient ^A | 60 | $^{\circ}C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case ^A | 2.4 | $^{\circ}C/W$ |

Electrical Characteristics (at $T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Units |
|--|---|--|------|------|------|-------|
| Static Parameters | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V,I _D =250uA | 40 | -- | -- | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =32V,V _{GS} =0V | -- | -- | 1 | uA |
| I _{GSS} | Gate-Body Leakage Current | V _{DS} =0V,V _{GS} =±20V | -- | -- | ±100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} ,I _D =250uA | 1.0 | 1.5 | 2.5 | V |
| R _{DS(ON)} | Drain-Source On-State Resistance ^B | V _{GS} =10V,I _D =15A | -- | 6.9 | 8.5 | mΩ |
| | | V _{GS} =4.5V,I _D =12A | -- | 10.5 | 15 | mΩ |
| R _G | Gate Resistance | V _{DS} =0V,V _{GS} =0V,f=1MHz | -- | 1.7 | -- | Ω |
| Dynamic and Switching Parameters | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V,V _{DS} =15V f=1MHZ | -- | 690 | -- | pF |
| C _{oss} | Output Capacitance | | -- | 193 | -- | pF |
| C _{rss} | Reverse Transfer Capacitance | | -- | 38 | -- | pF |
| Q _g | Total Gate Charge | V _{DS} =20V,I _D =12A V _{GS} =4.5V | -- | 5.8 | -- | nC |
| Q _{gs} | Gate-Source Charge | | -- | 3 | -- | nC |
| Q _{gd} | Gate-Drain Charge | | -- | 12 | -- | nC |
| t _{D(on)} | Turn-on Delay Time | V _{DS} =15V I _D =1A,R _G =3.3Ω, V _{GS} =10V | -- | 14.3 | -- | nS |
| t _r | Turn-on Rise Time | | -- | 5.6 | -- | nS |
| t _{D(off)} | Turn-off Delay Time | | -- | 20 | -- | nS |
| t _f | Turn-off Fall Time | | -- | 11 | -- | nS |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| V _{SD} | Forward Voltage ^B | I _S =1A,V _{GS} =0V | -- | -- | 1 | V |

A. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.

B. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

C. The E_{AS} data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=31A$.

D. The power dissipation is limited by 150°C junction temperature.

Typical Characteristics

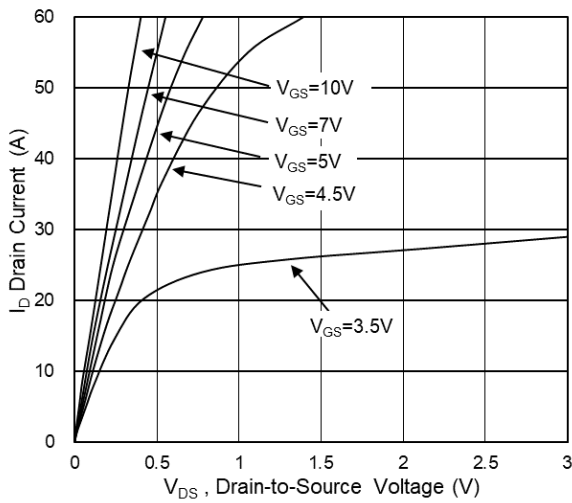


Fig.1 Typical Output Characteristics

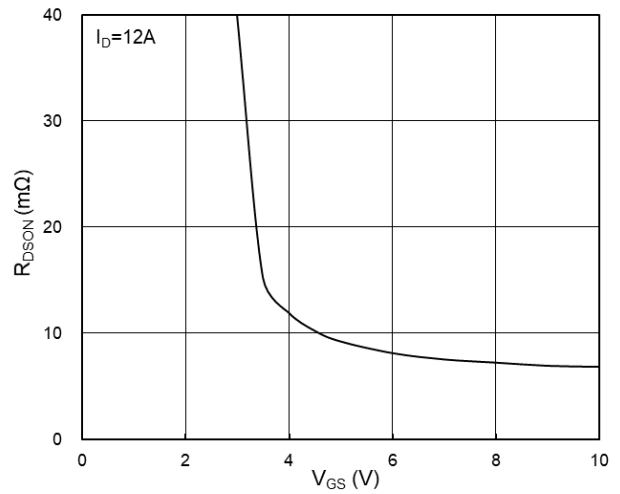


Fig.2 On-Resistance vs. G-S Voltage

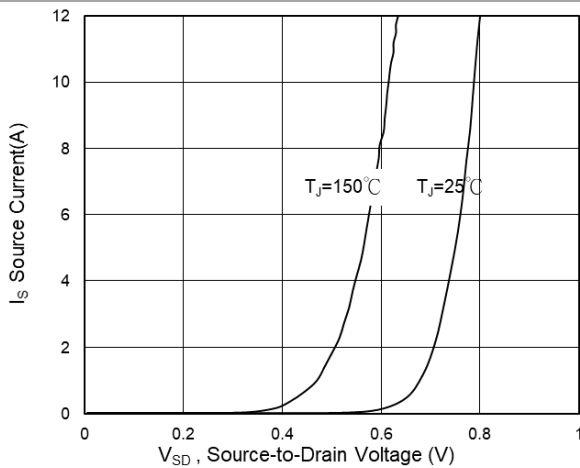


Fig.3 Source Drain Forward Characteristics

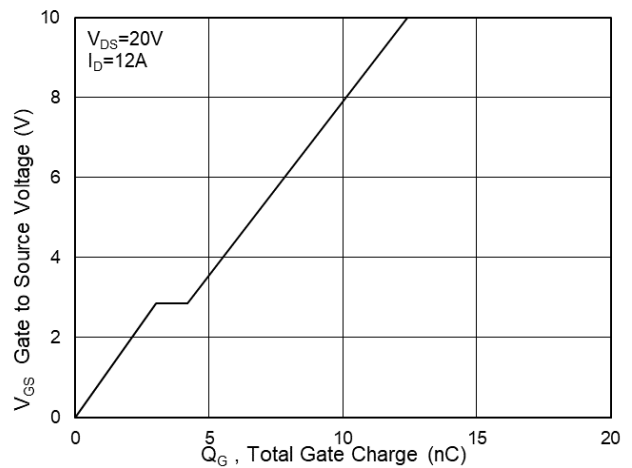


Fig.4 Gate-Charge Characteristics

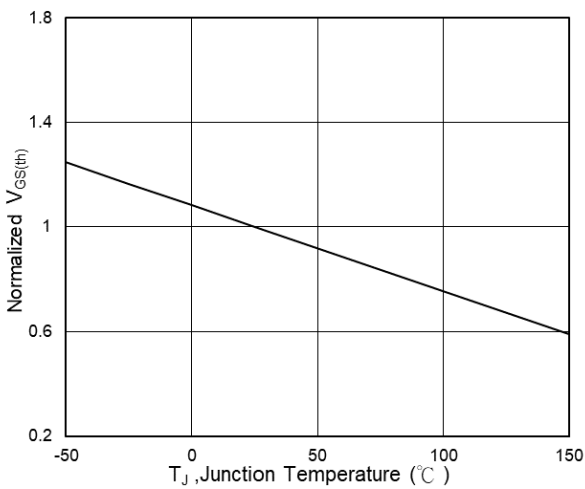


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

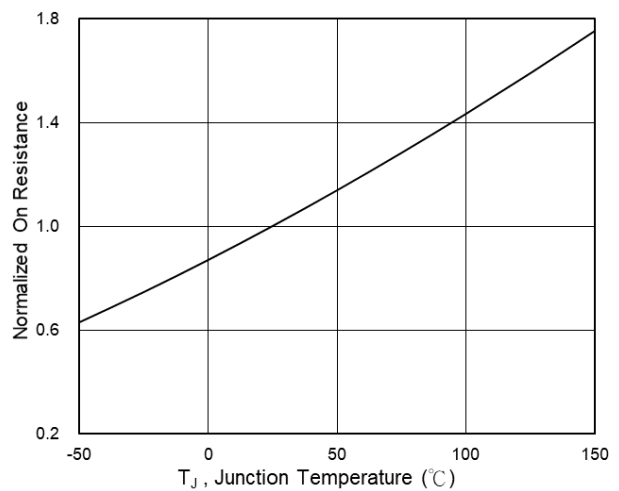


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

Typical Characteristics

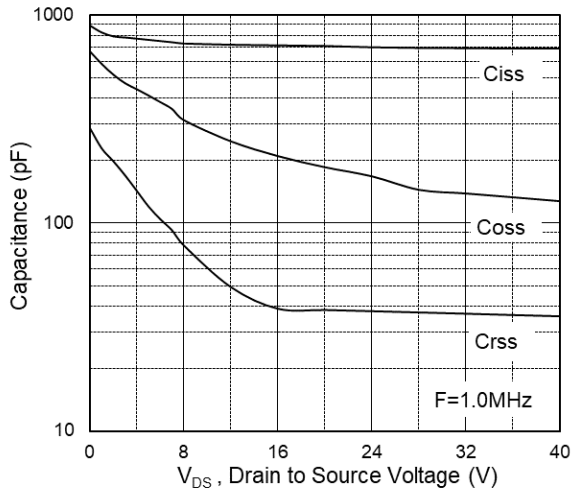


Fig.7 Capacitance

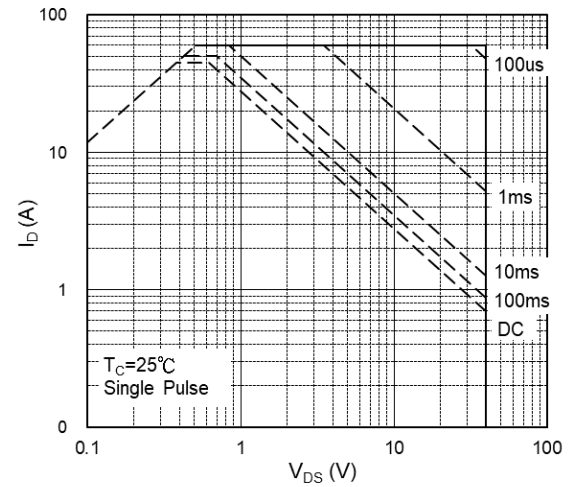


Fig.8 Safe Operating Area

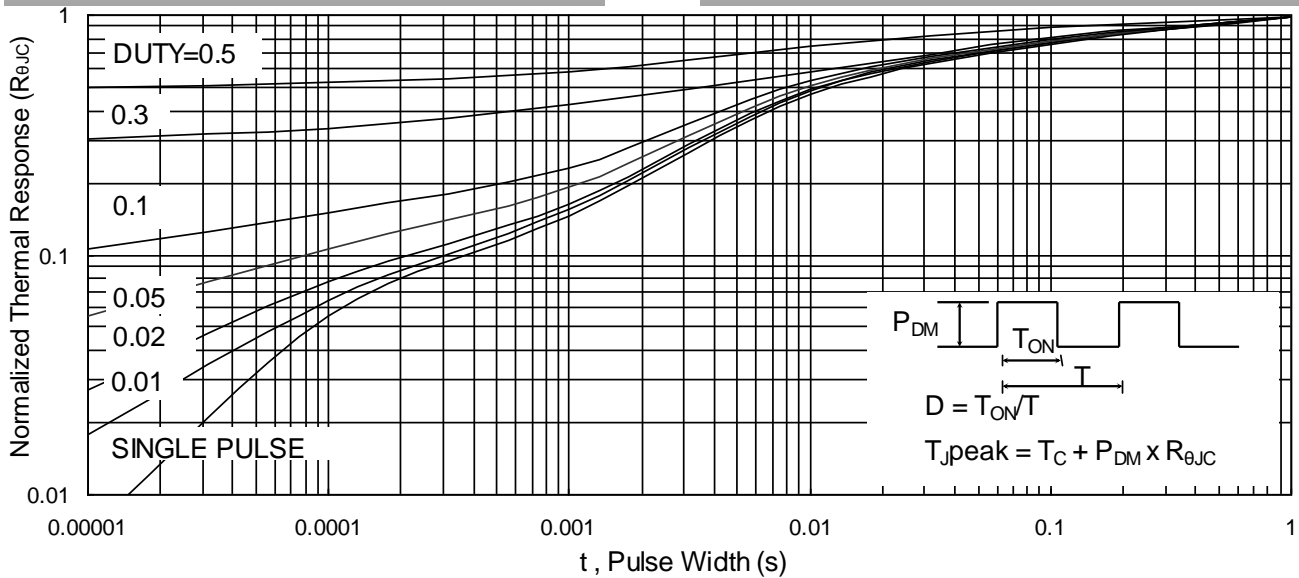


Fig.9 Normalized Maximum Transient Thermal Impedance

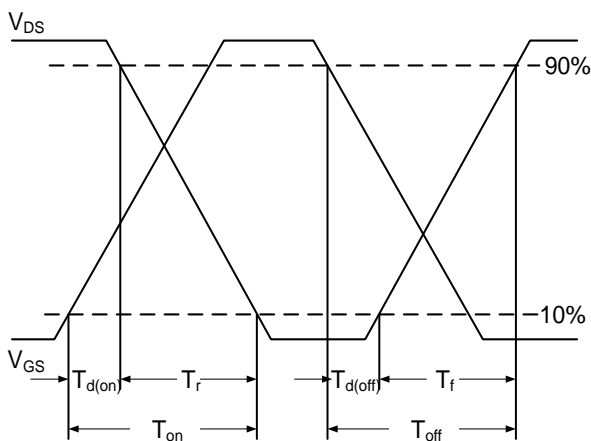


Fig.10 Switching Time Waveform

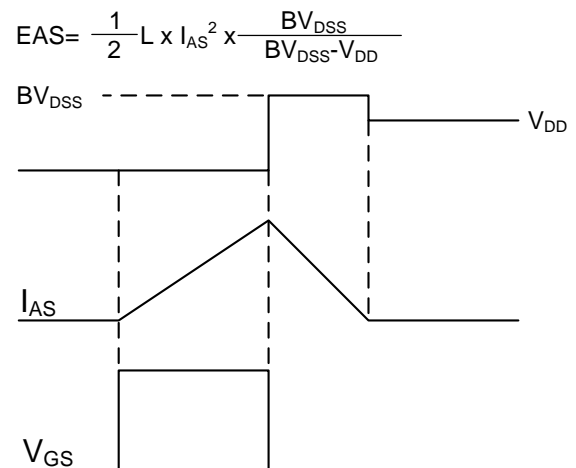
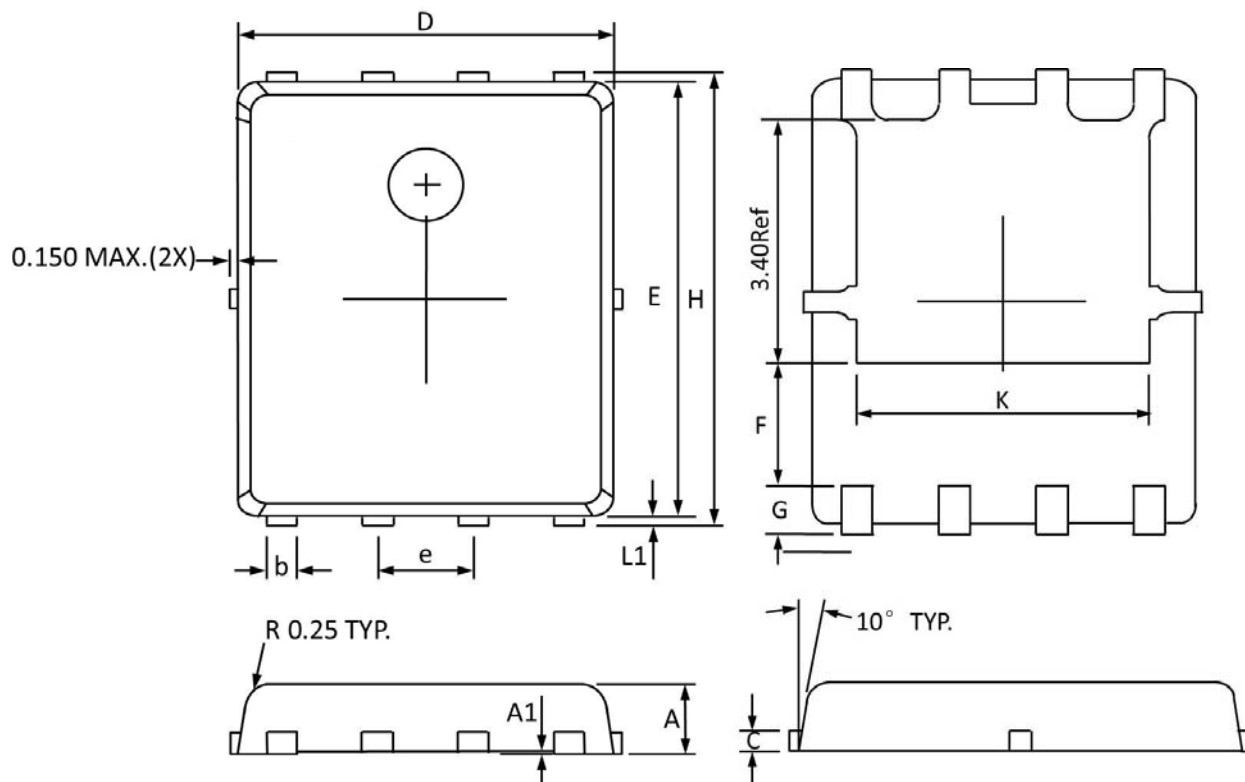


Fig.11 Unclamped Inductive Waveform

PDFN5X6-8L Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.800 | 1.000 | 0.032 | 0.039 |
| A1 | 0.000 | 0.005 | 0.000 | 0.000 |
| b | 0.350 | 0.490 | 0.014 | 0.019 |
| C | 0.254 Ref | | 0.254 Ref | |
| D | 4.900 | 5.100 | 0.193 | 0.200 |
| E | 5.700 | 5.900 | 0.225 | 0.232 |
| e | 1.27 BSC | | 1.27 BSC | |
| F | 1.400 Ref | | 1.400 Ref | |
| G | 0.600 Ref | | 0.600 Ref | |
| H | 5.950 | 6.200 | 0.235 | 0.244 |
| L1 | 0.100 | 0.180 | 0.004 | 0.007 |
| K | 4.000 Ref | | 4.000 Ref | |