

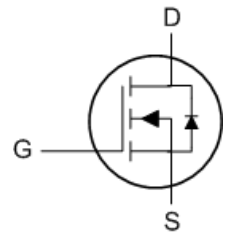
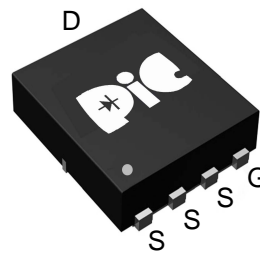
➤ General Description

This PAN40SY48Y N-Channel enhancement mode power field effect transistor is the high density trench technology and this advanced technology can provide excellent $R_{ds(On)}$ performance and efficiency for power switching and load switching application., this device also comply with the RoHS and Green Product requirement with full function reliability approved.

➤ Feature

- Super Low Gate Charge
- 100% EAS Guaranteed
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

➤ DFN5X6A-EP1



➤ Application

- DC/DC Primary Side Switch
- Industrial Synchronous
- Rectification Load Switch
- DC/DC Converters

➤ Absolute Maximum Ratings

| Parameter | Symbol | Rating | Units |
|---|-----------------------|------------|--------------|
| Drain-Source Voltage | V_{DS} | 40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current, V_{GS} @ 10V _{1.6} | $I_D@T_C=25^\circ C$ | 100 | A |
| Continuous Drain Current, V_{GS} @ 10V _{1.6} | $I_D@T_C=100^\circ C$ | 82 | A |
| Pulsed Drain Current ² | I_{DM} | 400 | A |
| Single Pulse Avalanche Energy ³ | EAS | 400 | mJ |
| Avalanche Current | I_{AS} | 40 | A |
| Total Power Dissipation ⁴ | $P_D@T_C=25^\circ C$ | 125 | W |
| Storage Temperature Range | T_{STG} | -55 to 150 | $^\circ C$ |
| Operating Junction Temperature Range | T_J | -55 to 150 | $^\circ C$ |
| Thermal Resistance Junction-Ambient ¹ | $R_{\theta JA}$ | 50 | $^\circ C/W$ |
| Thermal Resistance Junction-Case ¹ | $R_{\theta JC}$ | 1 | $^\circ C/W$ |

➤ Electrical Characteristics ($T_J=25^\circ C$ Unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|--------------|--|------|------|-----------|------------|
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V$, $I_D=250\mu A$ | 40 | --- | --- | V |
| Static Drain-Source OnResistance ₂ | $R_{DS(ON)}$ | $V_{GS}=10V$, $I_D=20A$ | --- | 1.5 | 1.8 | m Ω |
| | | $V_{GS}=4.5V$, $I_D=20A$ | --- | 2.0 | 2.6 | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}=V_{DS}$, $I_D=250\mu A$ | 1.2 | 1.6 | 2.2 | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=32V$, $V_{GS}=0V$, $T_J=25^\circ C$ | --- | --- | 1 | uA |
| | | $V_{DS}=32V$, $V_{GS}=0V$, $T_J=55^\circ C$ | --- | --- | 5 | |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V$, $V_{DS}=0V$ | --- | --- | ± 100 | nA |
| Forward Transconductance | g_{fs} | $V_{DS}=5V$, $I_D=20A$ | --- | 53 | --- | S |
| Gate Resistance | R_g | $V_{DS}=0V$, $V_{GS}=0V$, $f=1MHz$ | --- | 1.0 | --- | Ω |
| Total Gate Charge (4.5V) | Q_g | $V_{DS}=15V$, $V_{GS}=10V$, $I_D=20A$ | --- | 45 | --- | nC |
| Gate-Source Charge | Q_{gs} | | --- | 12 | --- | |
| Gate-Drain Charge | Q_{gd} | | --- | 18.5 | --- | |
| Turn-On Delay Time | $T_{d(on)}$ | $V_{DD}=15V$, $V_{GS}=10V$, $R_G=3.3\Omega$, $I_D=20A$ | --- | 18.5 | --- | ns |
| Rise Time | T_r | | --- | 9 | --- | |
| Turn-Off Delay Time | $T_{d(off)}$ | | --- | 58.5 | --- | |
| Fall Time | T_f | | --- | 32 | --- | |
| Input Capacitance | C_{iss} | $V_{DS}=20V$, $V_{GS}=0V$, $f=1MHz$ | --- | 3972 | --- | pF |
| Output Capacitance | C_{oss} | | --- | 1119 | --- | |
| Reverse Transfer Capacitance | C_{rss} | | --- | 82 | --- | |

➤ Diode Characteristics

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|--|----------|---|------|------|------|------|
| Continuous Source Current _{1,6} | I_S | $V_G=V_D=0V$, Force Current | --- | --- | 100 | A |
| Diode Forward Voltage ₂ | V_{SD} | $V_{GS}=0V$, $I_S=1A$, $T_J=25^\circ C$ | --- | --- | 1.2 | V |

Note :

1. Pulse width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The EAS data shows Max. rating. The test condition is $V_{DD}=25V$, $V_{GS}=10V$, $L=0.5mH$, $I_{AS}=40A$
4. Ensure that the channel temperature does not exceed $150^\circ C$.
5. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.
6. Package limitation current is 100A.

➤ Typical Characteristics

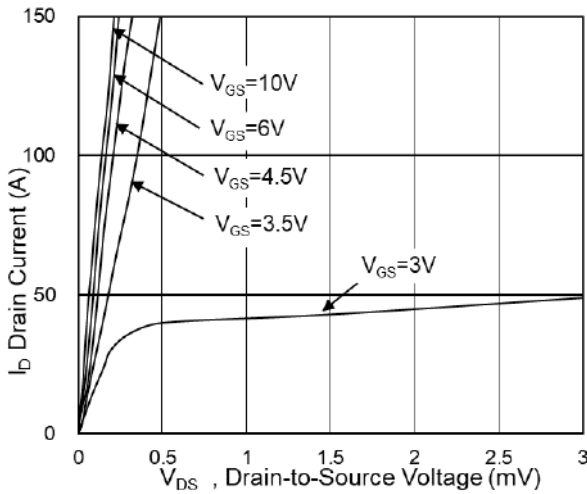


Fig.1 Typical Output Characteristics

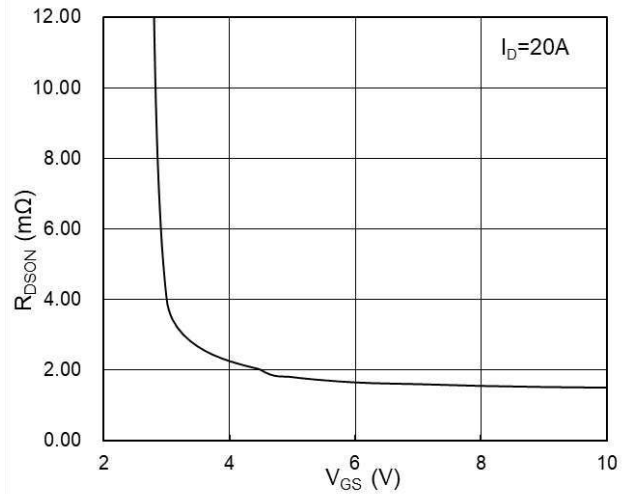


Fig.2 On-Resistance vs G-S Voltage

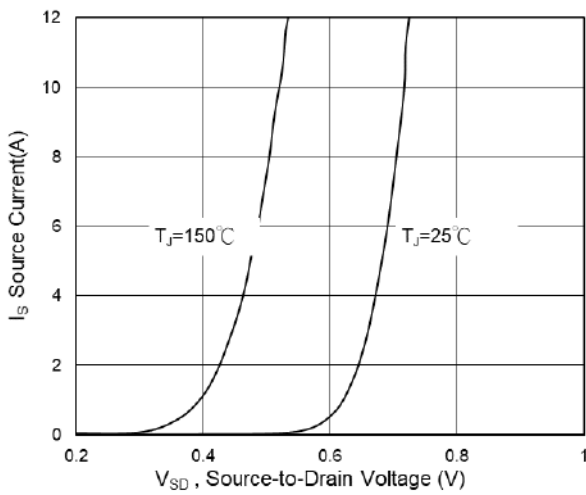


Fig.3 Source Drain Forward Characteristics

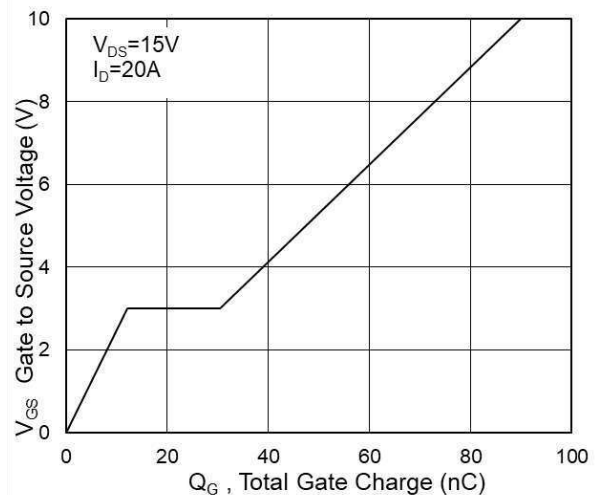


Fig.4 Gate-Charge Characteristics

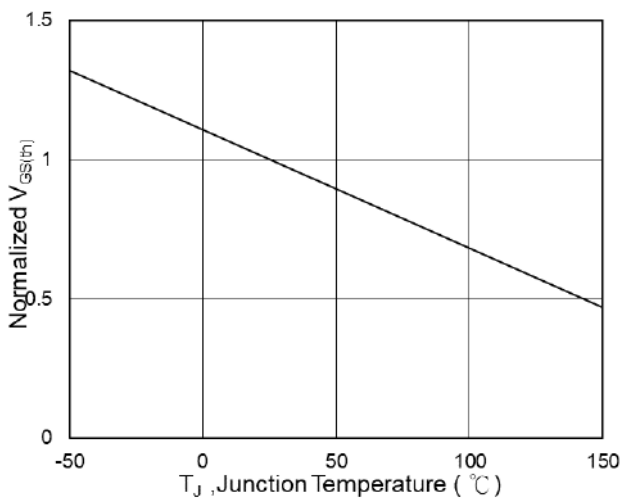


Fig.5 Normalized V_{GS(th)} vs T_J

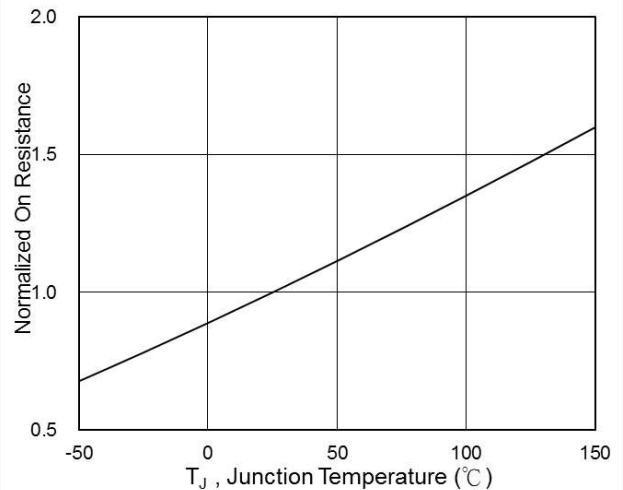


Fig.6 Normalized R_{DS(on)} vs T_J

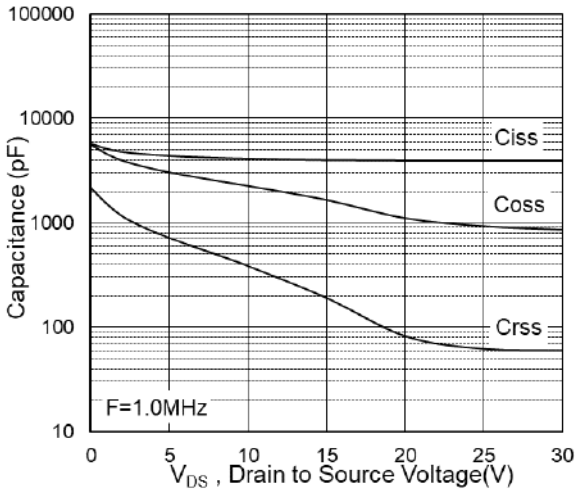


Fig.7 Capacitance

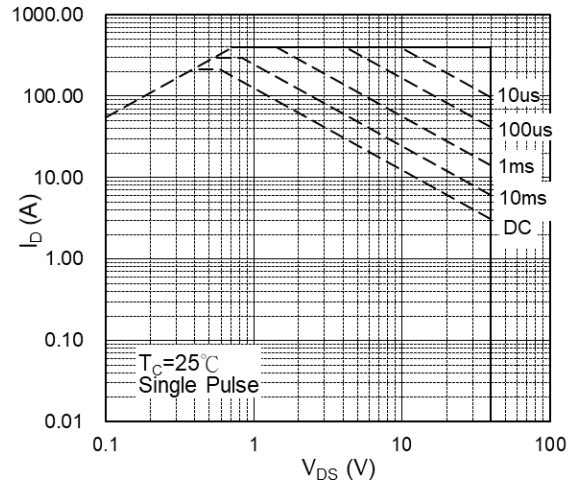


Fig.8 Safe Operating Area

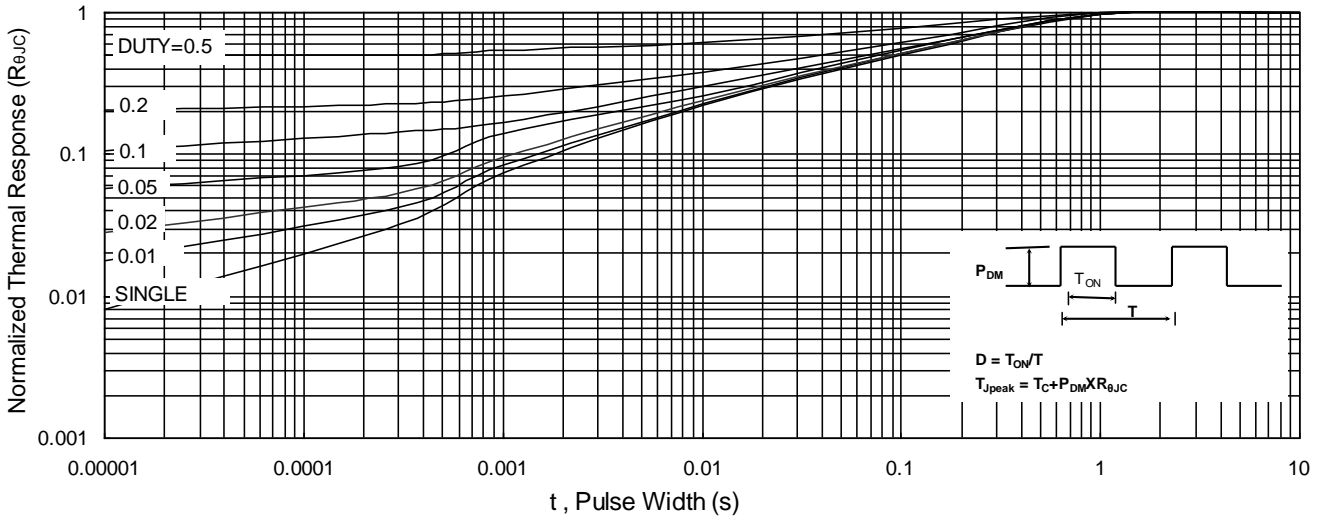


Fig.9 Normalized Maximum Transient Thermal Impedance

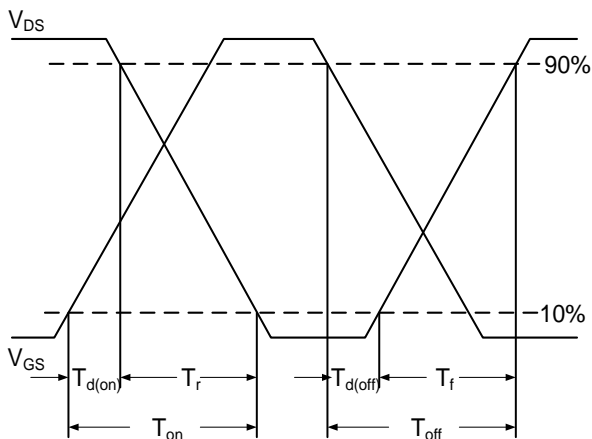


Fig.10 Switching Time Waveform

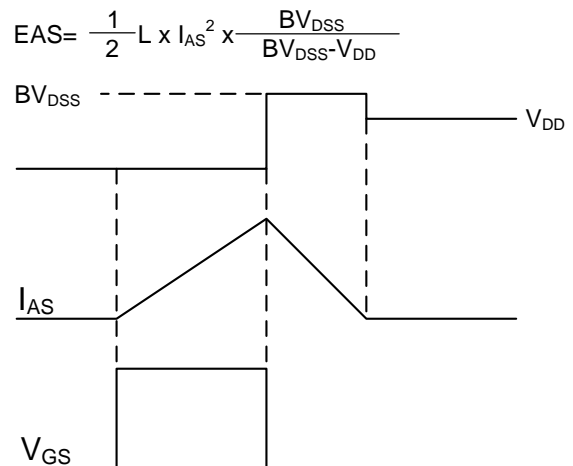


Fig.11 Unclamped Inductive Switching Waveform

➤ Recommand IR Reflow Soldering Thermal Profile

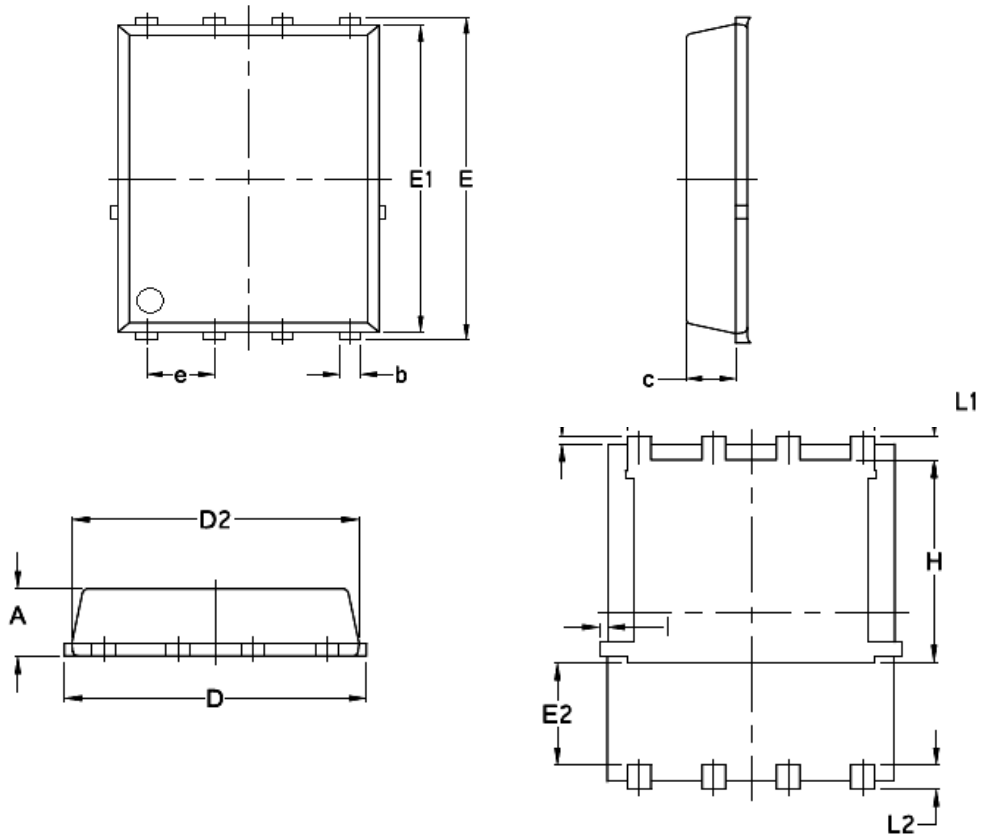


| Profile Feature | Pb-Free Assembly Profile |
|---|--------------------------|
| Temperature Min. (T _{smin}) | 150°C |
| Temperature Max. (T _{smax}) | 200°C |
| Time (t _s) from (T _{smin} to T _{smax}) | 60-120 seconds |
| Average Ramp-up Rate (t _L to t _P) | 3°C/second max. |
| Liquidous Temperature (T _L) | 217°C |
| Time (t _L) Maintained Above (T _L) | 60 – 150 seconds |
| Peak Temperature | 260°C +0°C / -5°C |
| Time (t _P) within 5°C of actual Peak Temperature | 30 seconds |
| Ramp-down Rate (T _P to T _L) | 6°C/second max |
| Time 25°C to Peak Temperature | 8 minutes max. |

➤ Ordering Information

| Part Number | Description | Quantity |
|-------------|------------------|----------|
| PAN40SY48Y | DFN5X6A-EP1 Reel | 3000 pcs |

➤ Package Information (DFN5X6A-EP1)



| SYMBOLS | MILLIMETERS | | INCHES | |
|---------|-------------|-------|----------|--------|
| | MIN | MAX | MIN | MAX |
| A | 1.03 | 1.17 | 0.0406 | 0.0461 |
| b | 0.34 | 0.48 | 0.0134 | 0.0189 |
| c | 0.824 | 0.970 | 0.0324 | 0.0382 |
| D | 4.80 | 5.40 | 0.1890 | 0.2126 |
| D1 | 4.11 | 4.31 | 0.1618 | 0.1697 |
| D2 | 4.80 | 5.00 | 0.1890 | 0.1969 |
| I | --- | 0.18 | --- | 0.0070 |
| E | 5.90 | 6.15 | 0.2323 | 0.2421 |
| E1 | 5.65 | 5.85 | 0.2224 | 0.2303 |
| E2 | 1.10 | --- | 0.0433 | --- |
| e | 1.27 BSC | | 0.05 BSC | |
| H | 3.30 | 3.78 | 0.1299 | 0.1488 |
| L | 0.05 | 0.25 | 0.0020 | 0.0098 |
| L1 | 0.38 | 0.61 | 0.0150 | 0.0240 |
| L2 | 0.38 | 0.71 | 0.0150 | 0.0279 |

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