

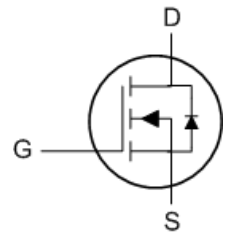
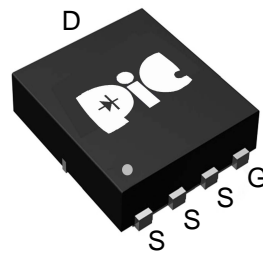
### ➤ General Description

This PAN80SY48Y 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                                | $V_{DS}$                | 80         | V            |
| Gate-Source Voltage                                 | $V_{GS}$                | $\pm 20$   | V            |
| Continuous Drain Current, $V_{GS} @ 10V_{1,6}$      | $I_D @ T_C=25^\circ C$  | 48         | A            |
| Continuous Drain Current, $V_{GS} @ 10V_{1,6}$      | $I_D @ T_C=100^\circ C$ | 42.5       | A            |
| Pulsed Drain Current <sup>2</sup>                   | $I_{DM}$                | 170        | A            |
| Single Pulse Avalanche Energy <sup>3</sup>          | EAS                     | 57.8       | mJ           |
| Avalanche Current                                   | $I_{AS}$                | 34         | A            |
| Total Power Dissipation <sup>4</sup>                | $P_D @ T_C=25^\circ C$  | 83         | 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 $1(t \leq 10s)$ | $R_{\theta JA}$         | 25         | $^\circ C/W$ |
| Thermal Resistance Junction-Ambient $1$             |                         | 55         | $^\circ C/W$ |
| Thermal Resistance Junction-Case $1$                | $R_{\theta JC}$         | 1.5        | $^\circ C/W$ |

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

| Parameter                                      | Symbol       | Conditions   | Min. | Typ. | Max.      | Unit      |
|--|--------------|--|------|------|-----------|-----------|
| Drain-Source Breakdown Voltage                 | $BV_{DSS}$   | $V_{GS}=0V$ , $I_D=250\mu A$                               | 80   | ---  | ---       | V         |
| Static Drain-Source On-Resistance <sup>2</sup> | $R_{DS(ON)}$ | $V_{GS}=10V$ , $I_D=20A$                                   | ---  | 4.3  | 6.5       | $m\Omega$ |
| Static Drain-Source On-Resistance <sup>2</sup> | $R_{DS(ON)}$ | $V_{GS}=4.5V$ , $I_D=20A$                                  | ---  | 6.3  | 8.5       | $m\Omega$ |
| Gate Threshold Voltage                         | $V_{GS(th)}$ | $V_{GS}=V_{DS}$ , $I_D=250\mu A$                           | 1.2  | ---  | 2.3       | V         |
| Drain-Source Leakage Current                   | $I_{DSS}$    | $V_{DS}=64V$ , $V_{GS}=0V$ , $T_J=25^\circ C$              | ---  | ---  | 1         | $\mu A$   |
|  |              | $V_{DS}=64V$ , $V_{GS}=0V$ , $T_J=55^\circ C$              | ---  | ---  | 5         |           |
| Gate-Source Leakage Current                    | $I_{GSS}$    | $V_{GS}=\pm 20V$ , $V_{DS}=0V$                             | ---  | ---  | $\pm 100$ | nA        |
| Forward Transconductance                       | $g_{fs}$     | $V_{DS}=5V$ , $I_D=20A$                                    | ---  | 75   | ---       | S         |
| Gate Resistance                                | $R_g$        | $V_{DS}=0V$ , $V_{GS}=0V$ , $f=1MHz$                       | ---  | 0.5  | ---       | $\Omega$  |
| Total Gate Charge (10V)                        | $Q_g$        | $V_{DS}=40V$ , $V_{GS}=10V$ , $I_D=20A$                    | ---  | 40   | ---       | nC        |
| Gate-Source Charge                             | $Q_{gs}$     |  | ---  | 7.2  | ---       |           |
| Gate-Drain Charge                              | $Q_{gd}$     |  | ---  | 6.5  | ---       |           |
| Turn-On Delay Time                             | $T_{d(on)}$  | $V_{DD}=40V$ , $V_{GS}=10V$ , $R_G=3\Omega$ ,<br>$I_D=20A$ | ---  | 8.3  | ---       | ns        |
| Rise Time                                      | $T_r$        |  | ---  | 4.2  | ---       |           |
| Turn-Off Delay Time                            | $T_{d(off)}$ |  | ---  | 36   | ---       |           |
| Fall Time                                      | $T_f$        |  | ---  | 6.9  | ---       |           |
| Input Capacitance                              | $C_{iss}$    | $V_{DS}=40V$ , $V_{GS}=0V$ , $f=1MHz$                      | ---  | 2860 | ---       | pF        |
| Output Capacitance                             | $C_{oss}$    |  | ---  | 410  | ---       |           |
| Reverse Transfer Capacitance                   | $C_{rss}$    |  | ---  | 38   | ---       |           |

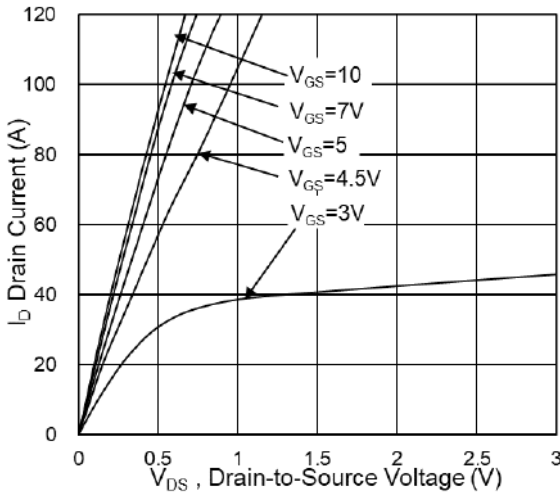
### ➤ Diode Characteristics

| Parameter                                | Symbol   | Conditions  | Min. | Typ. | Max. | Unit |
|--|----------|---|------|------|------|------|
| Continuous Source Current <sup>1,5</sup> | $I_S$    | $V_G=V_D=0V$ , Force Current                      | ---  | ---  | 48   | A    |
| Diode Forward Voltage <sup>2</sup>       | $V_{SD}$ | $V_{GS}=0V$ , $I_S=A$ , $T_J=25^\circ C$          | ---  | 0.77 | 1.0  | V    |
| Reverse Recovery Time                    | $t_{rr}$ | $I_F=20A$ , $dI/dt=100A/\mu s$ , $T_J=25^\circ C$ | ---  | 27   | ---  | nS   |
| Reverse Recovery Charge                  | $Q_{rr}$ |   | ---  | 89   | ---  | nC   |

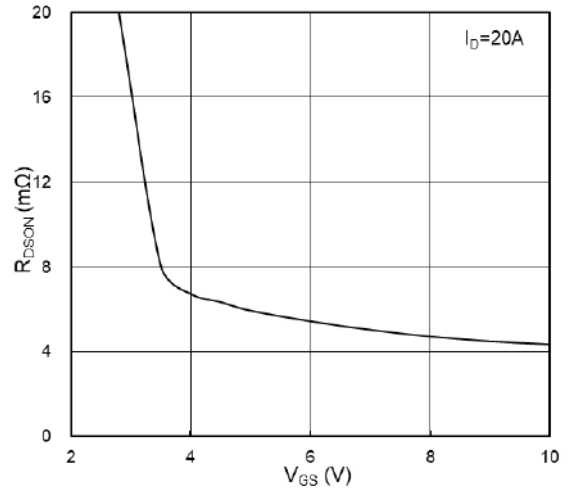
Note :

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  $V_{DD}=25V$ ,  $V_{GS}=10V$ ,  $L=0.1mH$ ,  $I_{AS}=34A$
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. The maximum current rating is package limited.

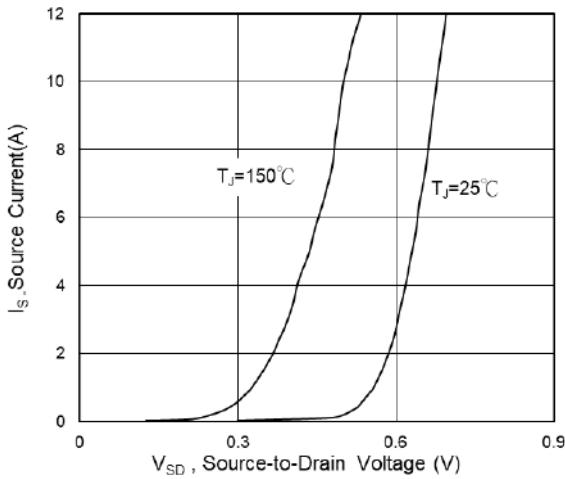
### ➤ Typical Characteristics



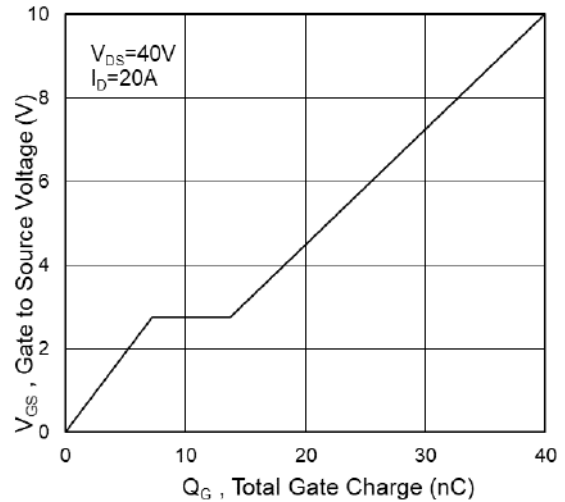
**Fig.1 Typical Output Characteristics**



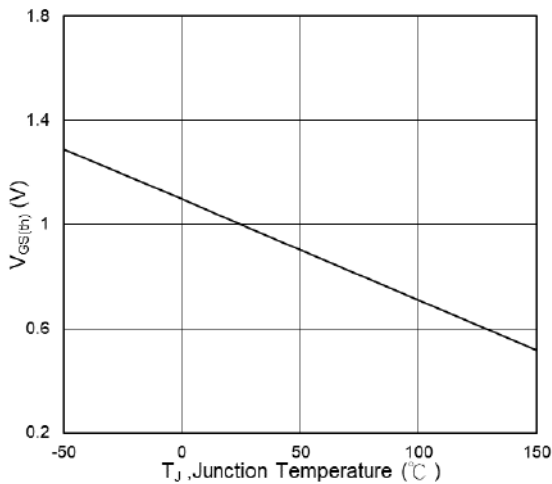
**Fig.2 On-Resistance vs G-S Voltage**



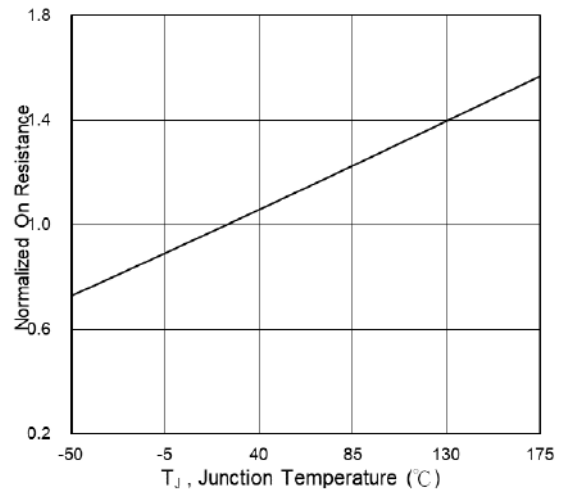
**Fig.3 Source Drain Forward Characteristics**



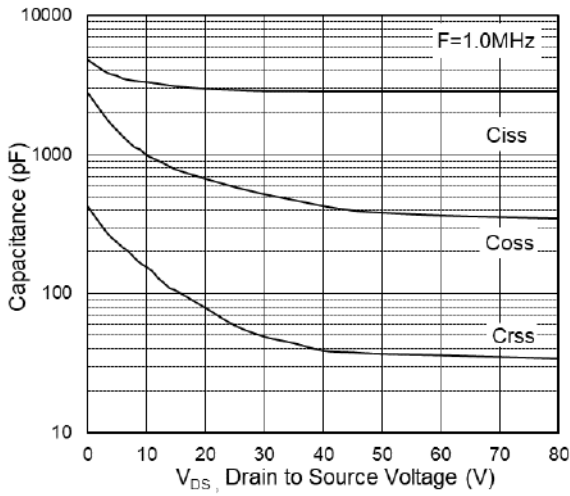
**Fig.4 Gate-Charge Characteristics**



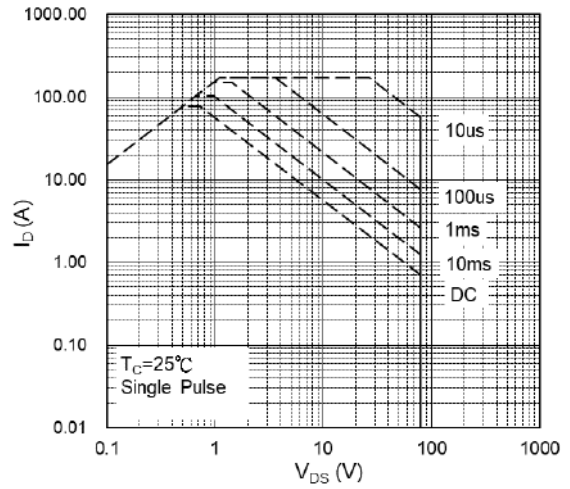
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



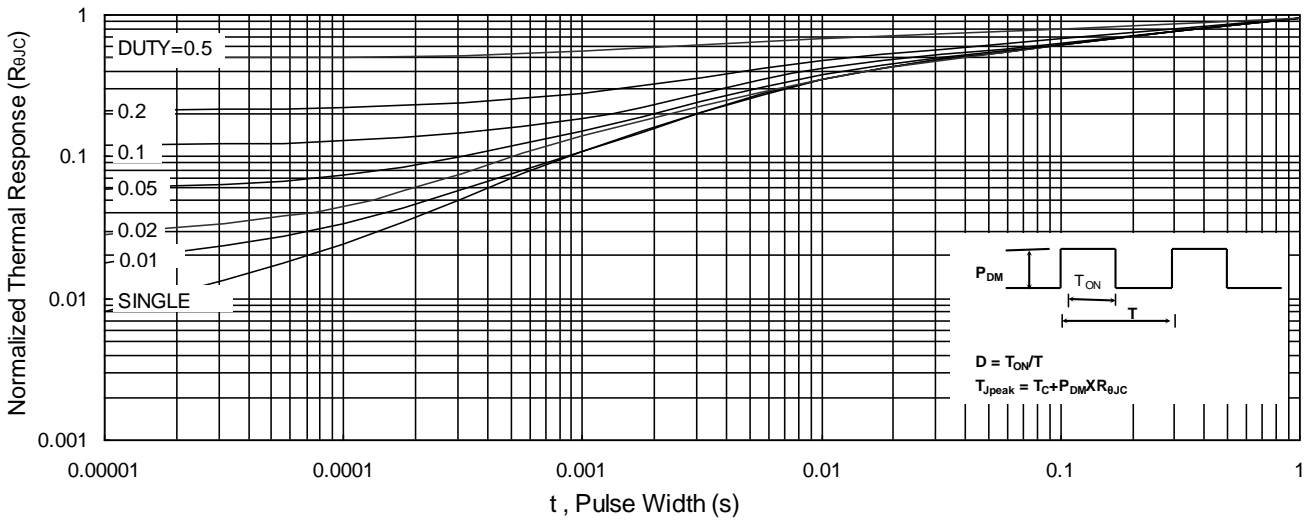
**Fig.6 Normalized  $R_{DS(ON)}$  vs.  $T_J$**



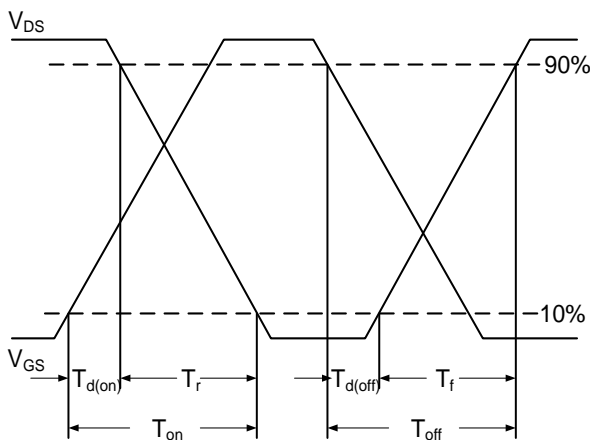
**Fig.7 Capacitance**



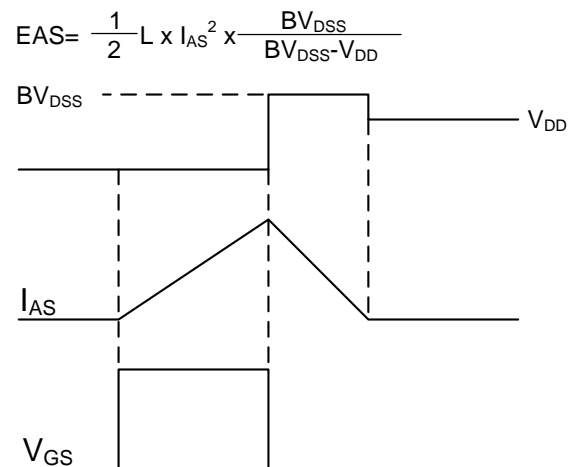
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**

## ➤ Recommand IR Reflow Soldering Thermal Profile

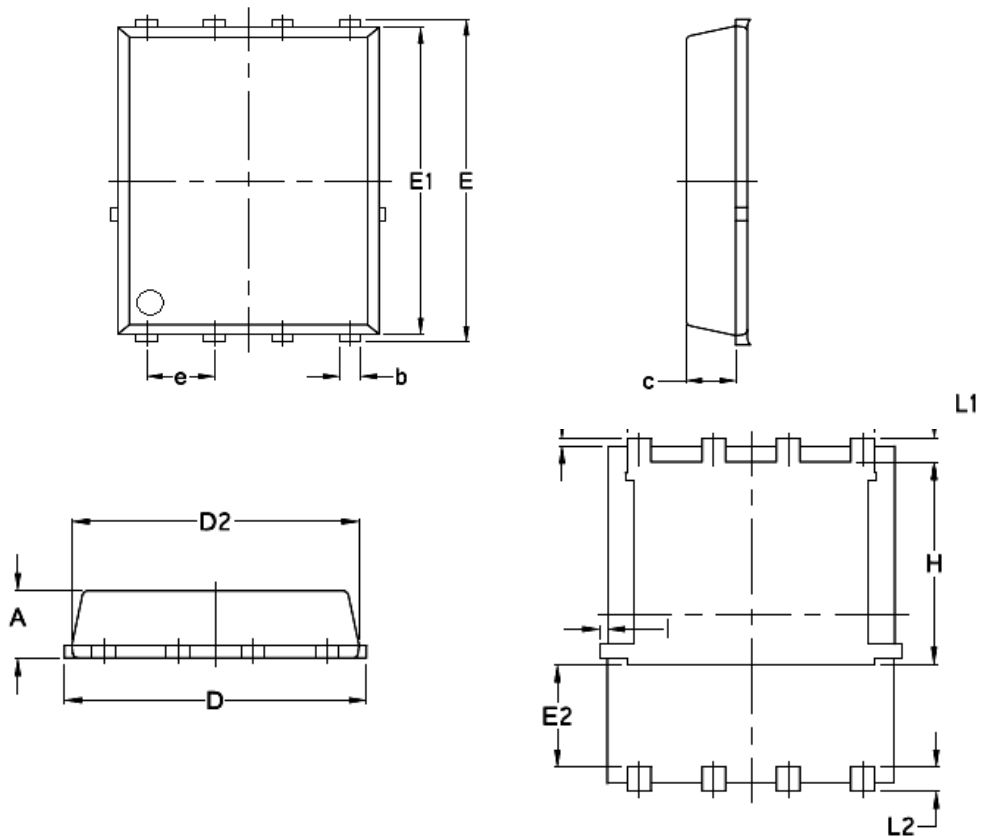


| Profile Feature   | Pb-Free Assembly Profile |
|---|--------------------------|
| Temperature Min. (T <sub>smin</sub> )                                 | 150°C                    |
| Temperature Max. (T <sub>smax</sub> )                                 | 200°C                    |
| Time (t <sub>s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

## ➤ Ordering Information

| Part Number | Description      | Quantity |
|-------------|------------------|----------|
| PAN80SY48Y  | 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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