

## General Description

The MY85P04NE5 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

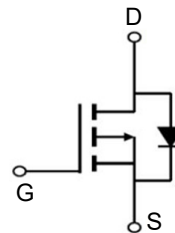
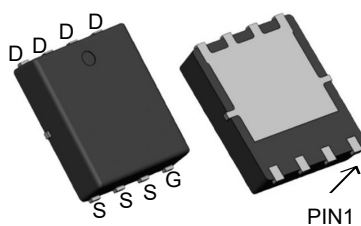


## Features

|                                 |     |           |
|---------------------------------|-----|-----------|
| $V_{DSS}$                       | -40 | V         |
| $I_D$                           | -85 | A         |
| $R_{DS(ON)}(at V_{GS} = -10V)$  | 3.6 | $m\Omega$ |
| $R_{DS(ON)}(at V_{GS} = -4.5V)$ | 4.9 | $m\Omega$ |

## Application

- Battery protection
- Load switch
- Uninterruptible power supply



## Package Marking and Ordering Information

| Product ID | Pack       | Marking    | Qty(PCS) |
|------------|------------|------------|----------|
| MY85P04NE5 | PDFN5*6-8L | MY85P04NE5 | 5000     |

## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Symbol                          | Parameter                                        | Rating     | Units              |
|---------------------------------|--------------------------------------------------|------------|--------------------|
| $V_{DS}$                        | Drain-Source Voltage                             | -40        | V                  |
| $V_{GS}$                        | Gate-Source Voltage                              | $\pm 20$   | V                  |
| $I_D @ T_C = 25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ -10V^1$      | -85        | A                  |
| $I_D @ T_C = 100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ -10V^1$      | -68        | A                  |
| $I_D @ T_A = 25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ -10V^1$      | -50        | A                  |
| $I_D @ T_A = 70^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ -10V^1$      | -36        | A                  |
| $I_{DM}$                        | Pulsed Drain Current <sup>2</sup>                | -270       | A                  |
| EAS                             | Single Pulse Avalanche Energy <sup>3</sup>       | 120        | mJ                 |
| $I_{AS}$                        | Avalanche Current                                | -54        | A                  |
| $P_D @ T_C = 25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>             | 52.1       | W                  |
| $P_D @ T_A = 25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>             | 2          | W                  |
| $T_{STG}$                       | Storage Temperature Range                        | -55 to 150 | $^\circ\text{C}$   |
| $T_J$                           | Operating Junction Temperature Range             | -55 to 150 | $^\circ\text{C}$   |
| $R_{\theta JA}$                 | Thermal Resistance Junction-Ambient <sup>1</sup> | 62         | $^\circ\text{C/W}$ |
| $R_{\theta JC}$                 | Thermal Resistance Junction-Case <sup>1</sup>    | 2.4        | $^\circ\text{C/W}$ |

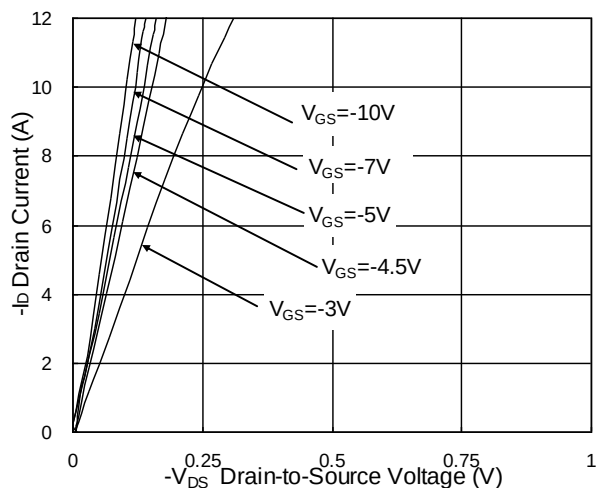
**Electrical Characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)**

| Symbol                       | Parameter                                      | Conditions                                                  | Min. | Typ.   | Max.      | Unit                |
|------------------------------|------------------------------------------------|-------------------------------------------------------------|------|--------|-----------|---------------------|
| $BV_{DSS}$                   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V$ , $I_D=-250\mu A$                               | -40  | ---    | ---       | V                   |
| $\Delta BV_{DSS}/\Delta T_J$ | $BV_{DSS}$ Temperature Coefficient             | Reference to $25^\circ\text{C}$ , $I_D=-1mA$                | ---  | -0.023 | ---       | $V/^\circ\text{C}$  |
| $R_{DS(ON)}$                 | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=-10V$ , $I_D=-18A$                                  | ---  | 3.6    | 4.9       | $m\Omega$           |
|                              |                                                | $V_{GS}=-4.5V$ , $I_D=-12A$                                 | ---  | 4.9    | 6.5       |                     |
| $V_{GS(th)}$                 | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=-250\mu A$                           | -1.0 | -1.6   | -2.5      | V                   |
| $\Delta V_{GS(th)}$          | $V_{GS(th)}$ Temperature Coefficient           |                                                             | ---  | 4.74   | ---       | $mV/^\circ\text{C}$ |
| $I_{DSS}$                    | Drain-Source Leakage Current                   | $V_{DS}=-32V$ , $V_{GS}=0V$ , $T_J=25^\circ\text{C}$        | ---  | ---    | 1         | $\mu A$             |
|                              |                                                | $V_{DS}=-32V$ , $V_{GS}=0V$ , $T_J=55^\circ\text{C}$        | ---  | ---    | 5         |                     |
| $I_{GSS}$                    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V$ , $V_{DS}=0V$                              | ---  | ---    | $\pm 100$ | nA                  |
| $g_{fs}$                     | Forward Transconductance                       | $V_{DS}=-5V$ , $I_D=-18A$                                   | ---  | 24     | ---       | S                   |
| $R_g$                        | Gate Resistance                                | $V_{DS}=0V$ , $V_{GS}=0V$ , $f=1MHz$                        | ---  | 7      | 14        |                     |
| $Q_g$                        | Total Gate Charge (-4.5V)                      | $V_{DS}=-20V$ , $V_{GS}=-4.5V$ , $I_D=-12A$                 | ---  | 27.9   | ---       | nC                  |
| $Q_{gs}$                     | Gate-Source Charge                             |                                                             | ---  | 7.7    | ---       |                     |
| $Q_{gd}$                     | Gate-Drain Charge                              |                                                             | ---  | 7.5    | ---       |                     |
| $T_{d(on)}$                  | Turn-On Delay Time                             | $V_{DD}=-15V$ , $V_{GS}=-10V$ ,<br>$R_G=3.3$ ,<br>$I_D=-1A$ | ---  | 40     | ---       | ns                  |
| $T_r$                        | Rise Time                                      |                                                             | ---  | 35.2   | ---       |                     |
| $T_{d(off)}$                 | Turn-Off Delay Time                            |                                                             | ---  | 100    | ---       |                     |
| $T_f$                        | Fall Time                                      |                                                             | ---  | 9.6    | ---       |                     |
| $C_{iss}$                    | Input Capacitance                              | $V_{DS}=-15V$ , $V_{GS}=0V$ , $f=1MHz$                      | ---  | 8000   | ---       | pF                  |
| $C_{oss}$                    | Output Capacitance                             |                                                             | ---  | 2000   | ---       |                     |
| $C_{rss}$                    | Reverse Transfer Capacitance                   |                                                             | ---  | 222    | ---       |                     |
| $I_S$                        | Continuous Source Current <sup>1,5</sup>       | $V_G=V_D=0V$ , Force Current                                | ---  | ---    | -52       | A                   |
| $I_{SM}$                     | Pulsed Source Current <sup>2,5</sup>           |                                                             | ---  | ---    | -105      | A                   |
| $V_{SD}$                     | Diode Forward Voltage <sup>2</sup>             | $V_{GS}=0V$ , $I_S=-1A$ , $T_J=25^\circ\text{C}$            | ---  | ---    | -1        | V                   |

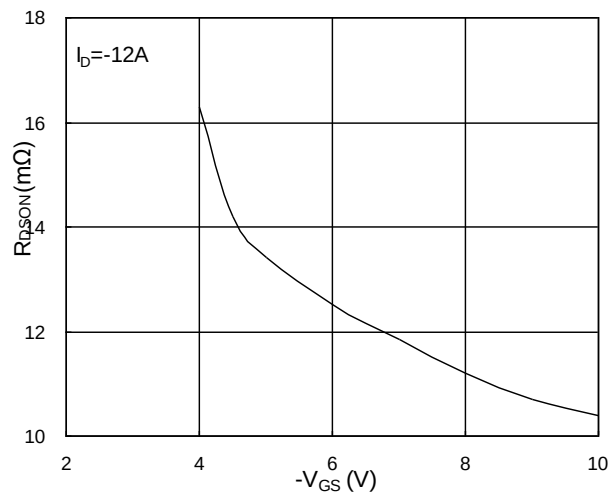
Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 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  $V_{DD}=-25V$ ,  $V_{GS}=-10V$ ,  $L=0.1mH$ ,  $I_{AS}=-54A$
- 4.The power dissipation is limited by  $150^\circ\text{C}$  junction temperature
- 5.The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications , should be limited by total power dissipation.

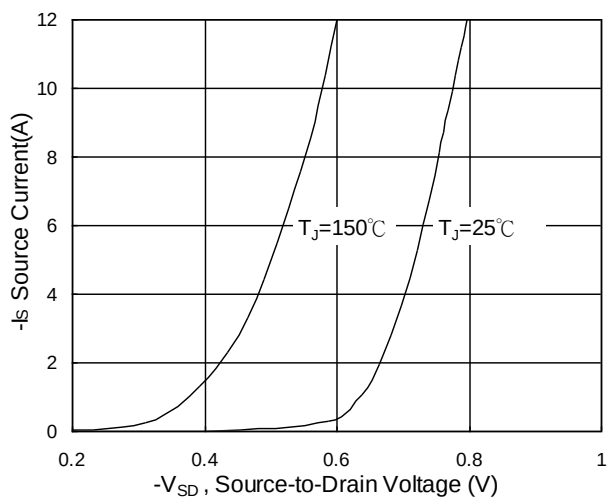
## Typical Characteristics



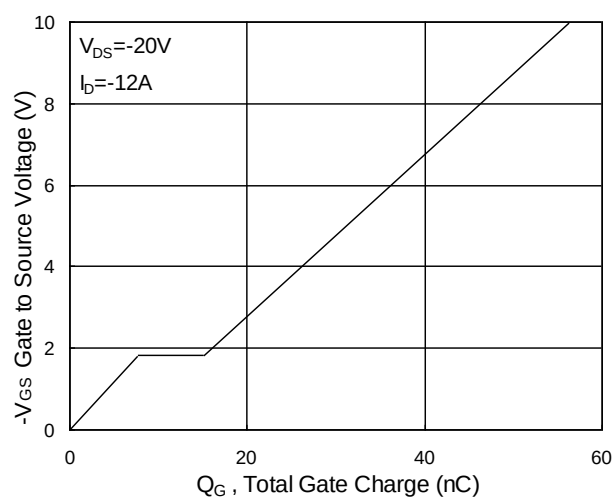
**Fig.1 Typical Output Characteristics**



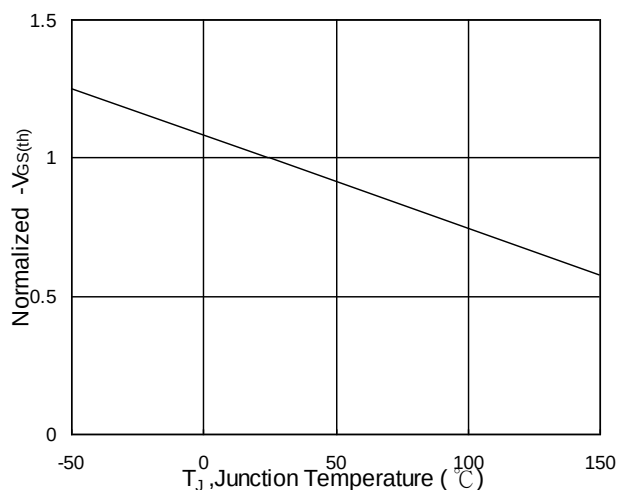
**Fig.2 On-Resistance v.s Gate-Source**



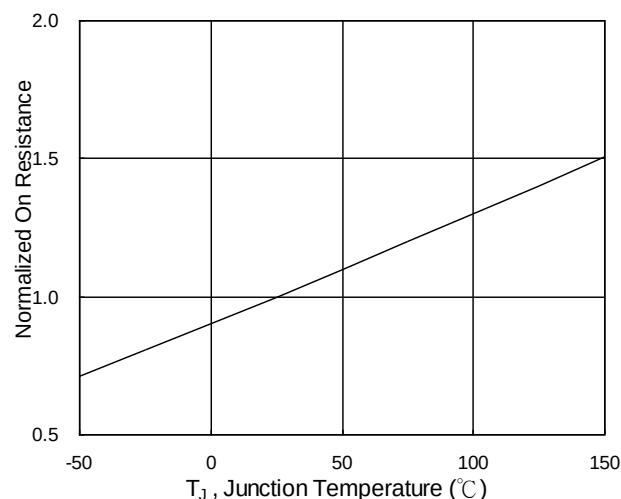
**Fig.3 Forward Characteristics Of Reverse**



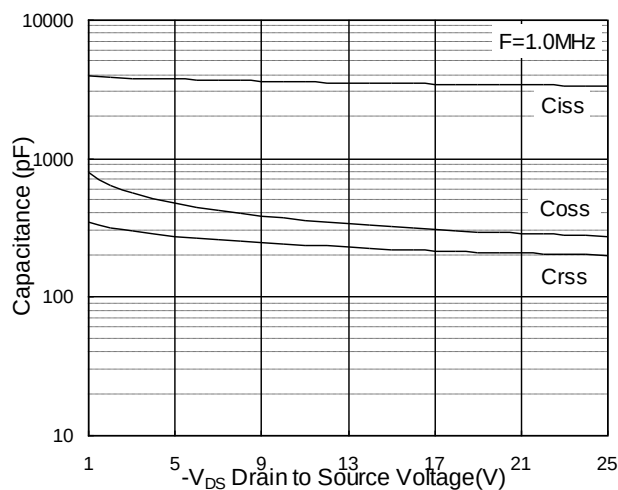
**Fig.4 Gate-Charge Characteristics**



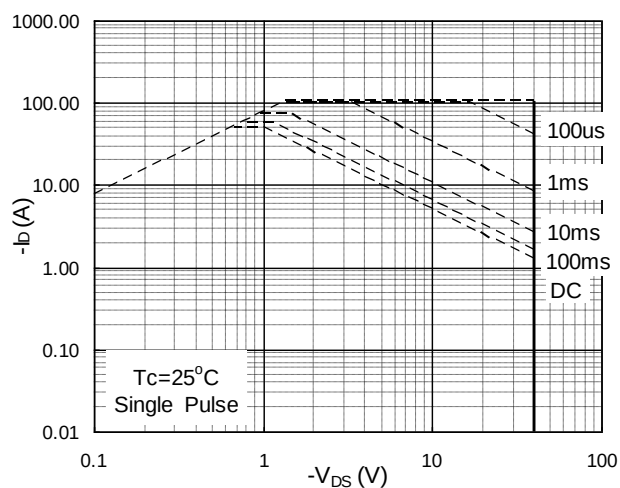
**Fig.5 Normalized  $V_{GS(th)}$  v.s  $T_J$**



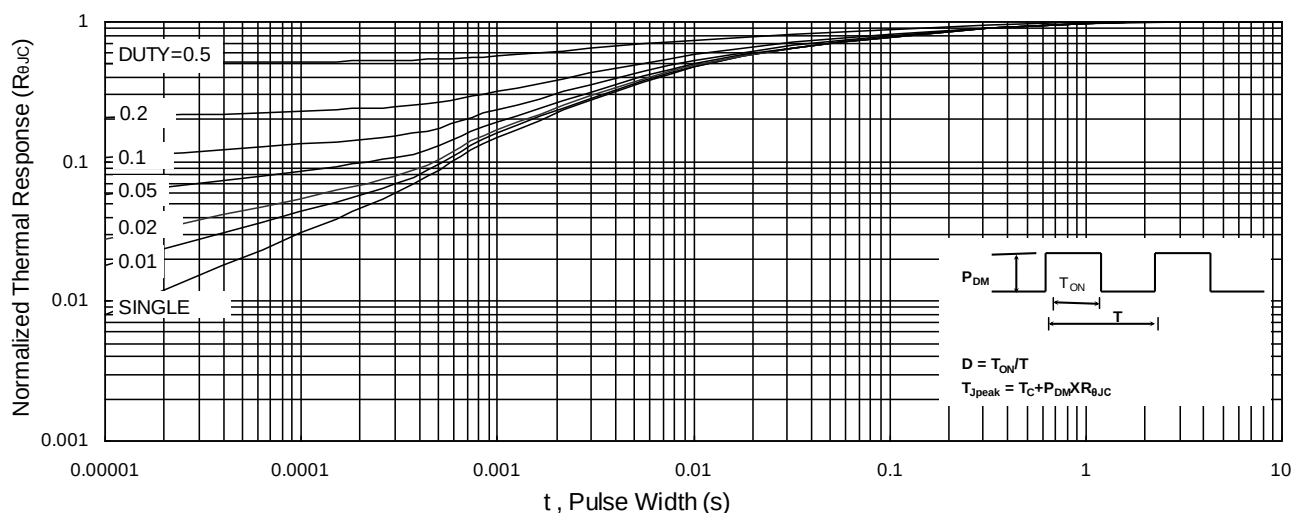
**Fig.6 Normalized  $R_{DS(on)}$  v.s  $T_J$**



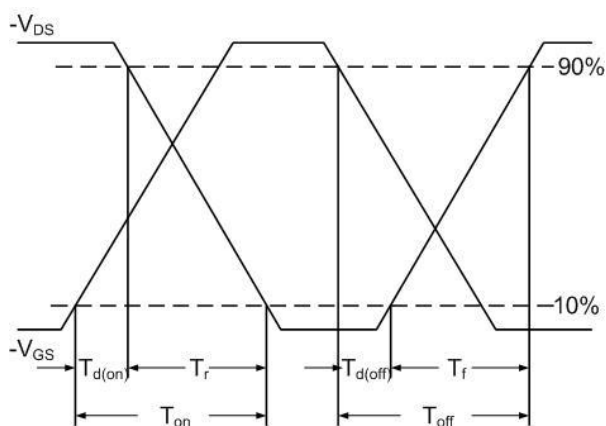
**Fig.7 Capacitance**



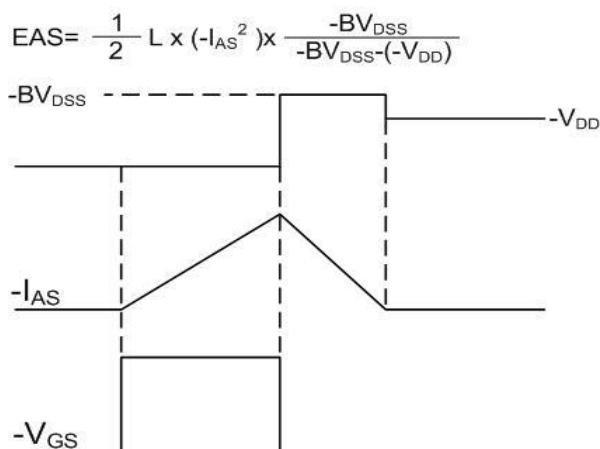
**Fig.8 Safe Operating Area**



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

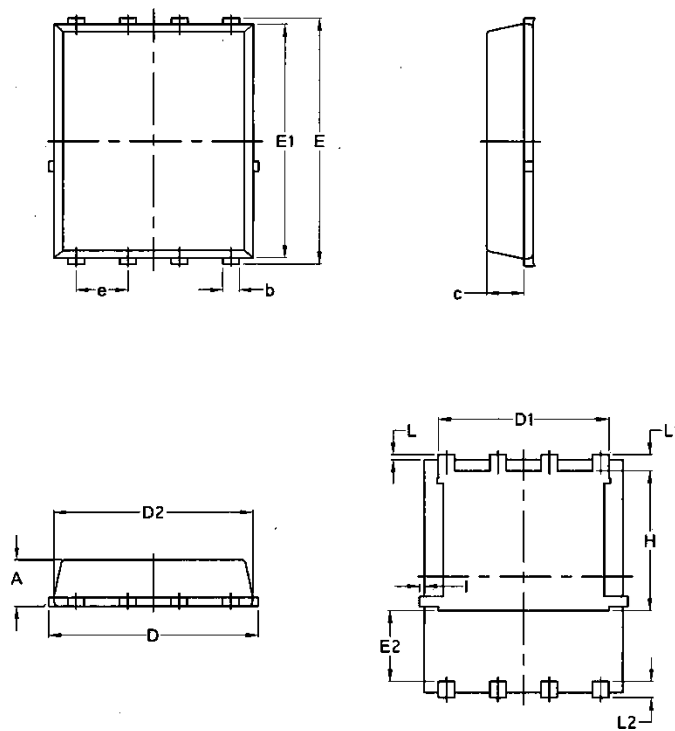


**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Waveform**

**Package Mechanical Data-DFN5\*6-8L-JQ Single**



| Symbol | Common   |        |          |        |
|--------|----------|--------|----------|--------|
|        | mm       |        | Inch     |        |
|        | Mim      | Max    | Min      | Max    |
| A      | 1.03     | 1.17   | 0.0406   | 0.0461 |
| b      | 0.34     | 0.48   | 0.0134   | 0.0189 |
| c      | 0.824    | 0.0970 | 0.0324   | 0.082  |
| 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 |
| E      | 5.95     | 6.15   | 0.2343   | 0.2421 |
| E1     | 5.65     | 5.85   | 0.2224   | 0.2303 |
| E2     | 1.60     | /      | 0.0630   | /      |
| e      | 1.27 BSC |        | 0.05 BSC |        |
| L      | 0.05     | 0.25   | 0.0020   | 0.0098 |
| L1     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| L2     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| H      | 3.30     | 3.50   | 0.1299   | 0.1378 |
| I      | /        | 0.18   | /        | 0.0070 |