

RoHS Compliant Product  
A suffix of "-C" specifies halogen free

## DESCRIPTION

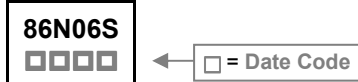
The SSD86N06S-C is the highest performance N-Ch MOSFETs with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The SSD86N06S-C meet the RoHS and Green Product requirement with full function reliability approved.

## FEATURES

- High Speed Power Switching
- Super Low Gate Charge
- Green Device Available

## MARKING



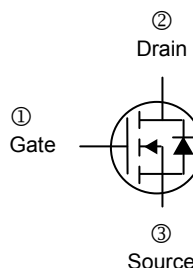
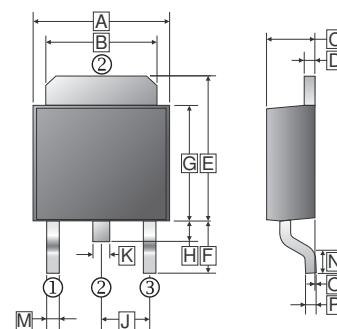
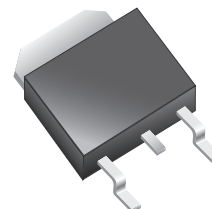
## PACKAGE INFORMATION

| Package | MPQ  | Leader Size |
|---------|------|-------------|
| TO-252  | 2.5K | 13 inch     |

## ORDER INFORMATION

| Part Number | Type                            |
|-------------|---------------------------------|
| SSD86N06S-C | Lead (Pb)-free and Halogen-free |

## TO-252(D-Pack)



| REF. | Millimeter |      | REF. | Millimeter |      |
|------|------------|------|------|------------|------|
|      | Min.       | Max. |      | Min.       | Max. |
| A    | 6.3        | 6.9  | J    | 2.3        | REF. |
| B    | 4.95       | 5.53 | K    | 0.89       | REF. |
| C    | 2.1        | 2.5  | M    | 0.45       | 1.14 |
| D    | 0.4        | 0.9  | N    | 1.55       | Typ. |
| E    | 6          | 7.7  | O    | 0          | 0.15 |
| F    | 2.90       | REF. | P    | 0.58       | REF. |
| G    | 5.4        | 6.4  |      |            |      |
| H    | 0.6        | 1.2  |      |            |      |

## ABSOLUTE MAXIMUM RATINGS

| Parameter  | Symbol          | Ratings           | Unit         |
|--|-----------------|-------------------|--------------|
| Drain-Source Voltage                                     | $V_{DS}$        | 60                | V            |
| Gate-Source Voltage                                      | $V_{GS}$        | $\pm 20$          | V            |
| Continuous Drain Current <sup>1</sup> , @ $V_{GS}=10V$   | $I_D$           | $T_C=25^\circ C$  | 86           |
|  |                 | $T_C=100^\circ C$ | 55           |
| Pulsed Drain Current <sup>2</sup>                        | $I_{DM}$        | 190               | A            |
| Total Power Dissipation <sup>3</sup>                     | $P_D$           | 52                | W            |
| Operating Junction and Storage Temperature Range         | $T_J, T_{STG}$  | -55~150           | $^\circ C$   |
| <b>Thermal Resistance Ratings</b>                        |                 |                   |              |
| Maximum Thermal Resistance Junction-Ambient <sup>1</sup> | $R_{\theta JA}$ | 62                | $^\circ C/W$ |
| Maximum Thermal Resistance Junction-Case <sup>1</sup>    | $R_{\theta JC}$ | 2.4               |              |

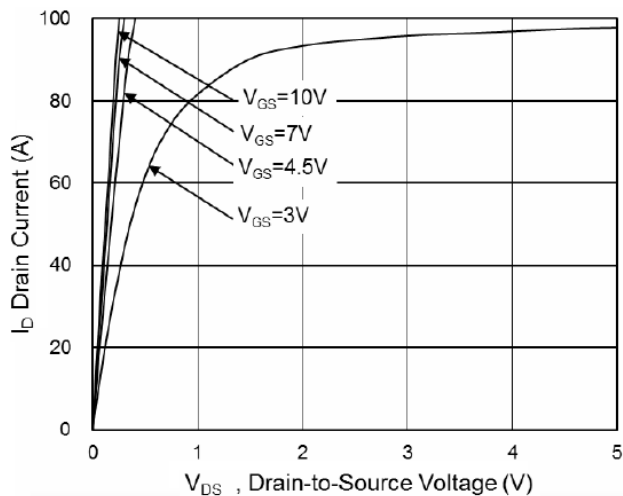
**ELECTRICAL CHARACTERISTICS** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

| Parameter                                      | Symbol       | Min.                   | Typ. | Max.      | Unit       | Test Conditions   |                               |
|--|--------------|------------------------|------|-----------|------------|---|-------------------------------|
| Drain-Source Breakdown Voltage                 | $BV_{DSS}$   | 60                     | -    | -         | V          | $V_{GS}=0, I_D=250\mu\text{A}$  |                               |
| Gate Threshold Voltage                         | $V_{GS(th)}$ | 1                      | -    | 2.5       | V          | $V_{DS}=V_{GS}, I_D=250\mu\text{A}$   |                               |
| Forward Transconductance                       | $g_{fs}$     | -                      | 65   | -         | S          | $V_{DS}=5\text{V}, I_D=20\text{A}$  |                               |
| Gate-Source Leakage Current                    | $I_{GSS}$    | -                      | -    | $\pm 100$ | nA         | $V_{GS}= \pm 20\text{V}$  |                               |
| Drain-Source Leakage Current                   | $I_{DSS}$    | $T_J=25^\circ\text{C}$ | -    | -         | 1          | $\mu\text{A}$   | $V_{DS}=48\text{V}, V_{GS}=0$ |
|  |              | $T_J=55^\circ\text{C}$ | -    | -         | 5          |   | $V_{DS}=48\text{V}, V_{GS}=0$ |
| Static Drain-Source On-Resistance <sup>2</sup> | $R_{DS(ON)}$ | -                      | 3.6  | 4.2       | m $\Omega$ | $V_{GS}=10\text{V}, I_D=15\text{A}$   |                               |
|  |              | -                      | 5.1  | 6.2       |            | $V_{GS}=4.5\text{V}, I_D=15\text{A}$  |                               |
| Total Gate Charge                              | $Q_g$        | -                      | 58   | -         | nC         | $I_D=15\text{A}$<br>$V_{DS}=30\text{V}$<br>$V_{GS}=10\text{V}$                  |                               |
| Gate-Source Charge                             | $Q_{gs}$     | -                      | 16   | -         |            |   |                               |
| Gate-Drain Change                              | $Q_{gd}$     | -                      | 4    | -         |            |   |                               |
| Turn-on Delay Time                             | $T_{d(on)}$  | -                      | 18   | -         | nS         | $V_{DD}=30\text{V}$<br>$I_D=15\text{A}$<br>$V_{GS}=10\text{V}$<br>$R_G=3\Omega$ |                               |
| Rise Time                                      | $T_r$        | -                      | 8    | -         |            |   |                               |
| Turn-off Delay Time                            | $T_{d(off)}$ | -                      | 50   | -         |            |   |                               |
| Fall Time                                      | $T_f$        | -                      | 10.5 | -         |            |   |                               |
| Input Capacitance                              | $C_{iss}$    | -                      | 3458 | -         | pF         | $V_{GS}=0$<br>$V_{DS}=30\text{V}$<br>$f=1\text{MHz}$                            |                               |
| Output Capacitance                             | $C_{oss}$    | -                      | 1042 | -         |            |   |                               |
| Reverse Transfer Capacitance                   | $C_{rss}$    | -                      | 22   | -         |            |   |                               |
| <b>Source-Drain Diode</b>                      |              |                        |      |           |            |   |                               |
| Diode Forward Voltage <sup>2</sup>             | $V_{SD}$     | -                      | -    | 1.2       | V          | $V_{GS}=0, I_S=1\text{A}, T_J=25^\circ\text{C}$                                 |                               |
| Continuous Source Current <sup>1</sup>         | $I_S$        | -                      | -    | 86        | A          |   |                               |
| Reverse Recovery Time                          | $t_{rr}$     | -                      | 24   | -         | nS         | $I_F=20\text{A}, di/dt=100\text{A}/\mu\text{s},$<br>$T_J=25^\circ\text{C}$      |                               |
| Reverse Recovery Charge                        | $Q_{rr}$     | -                      | 85   | -         | nC         |   |                               |

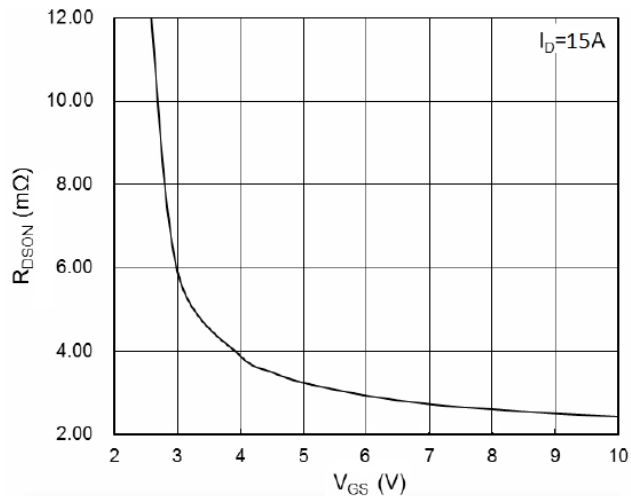
Notes:

1. Surface Mounted on 1inch<sup>2</sup> FR4 Board with 2OZ copper.
2. The data tested by pulsed, Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
3. The power dissipation is limited by 150°C, junction temperature.

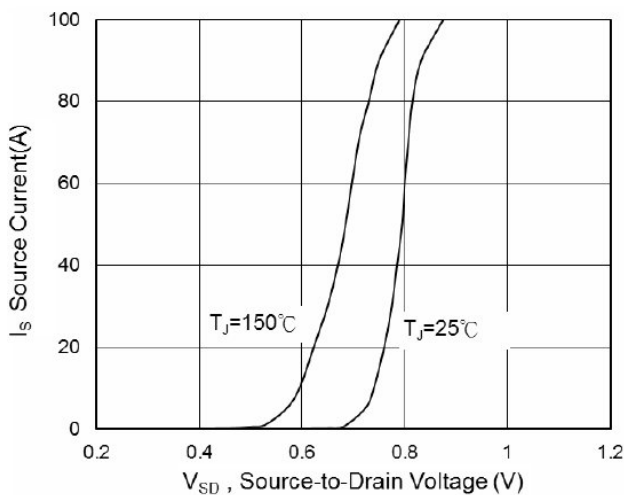
**TYPICAL CHARACTERISTICS CURVE**



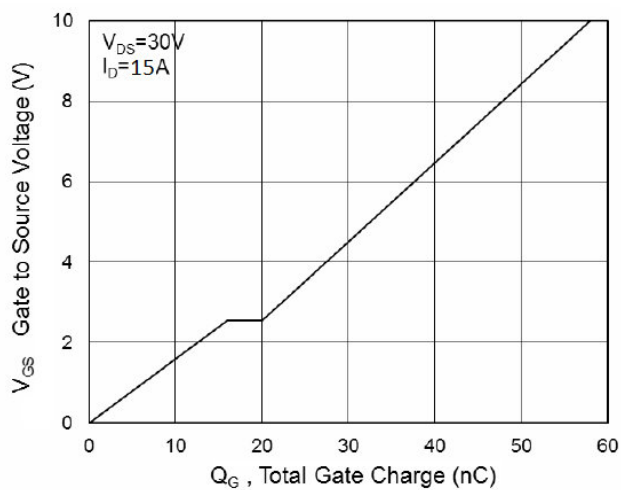
**Fig.1 Typical Output Characteristics**



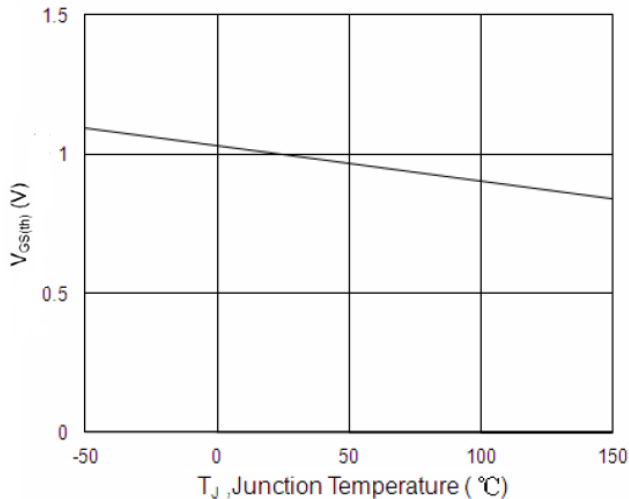
**Fig.2 On-Resistance vs G-S Voltage**



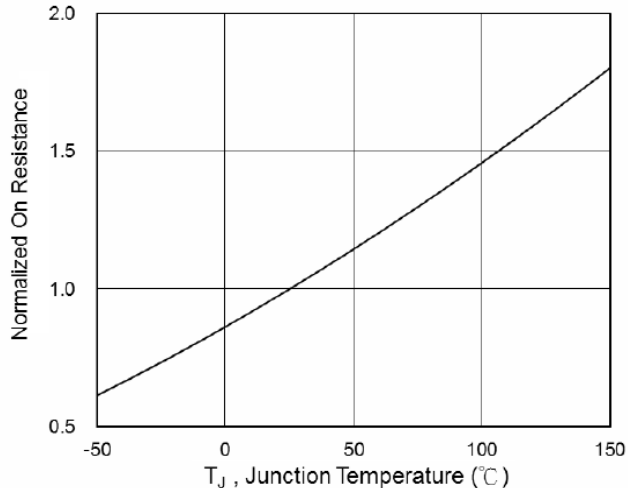
**Fig.3 Diode Forward Voltage vs. Current**



**Fig.4 Gate-Charge Characteristics**

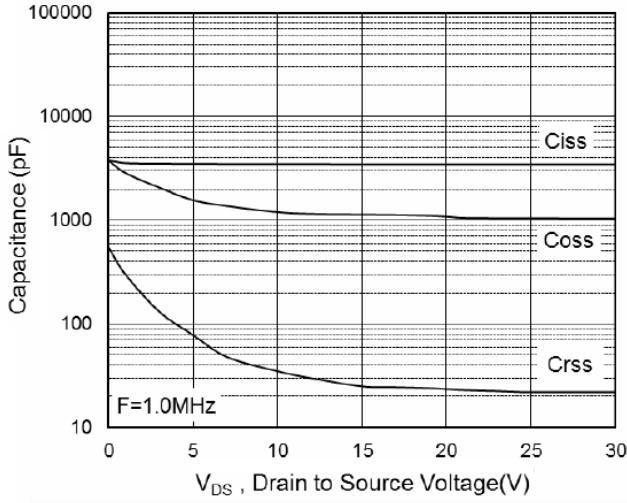


**Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$**

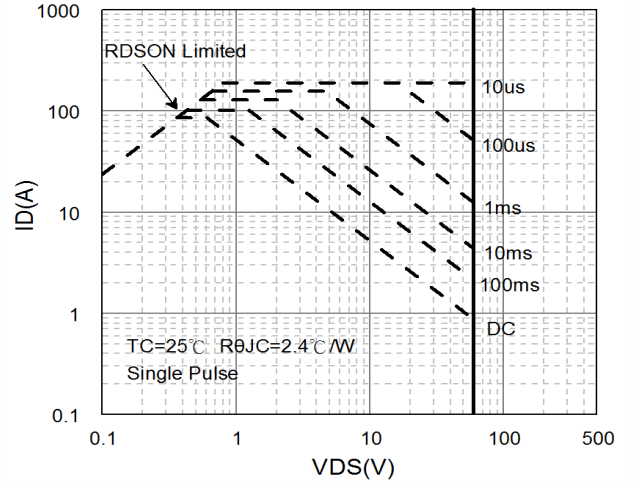


**Fig.6 Normalized  $R_{DS(ON)}$  vs  $T_J$**

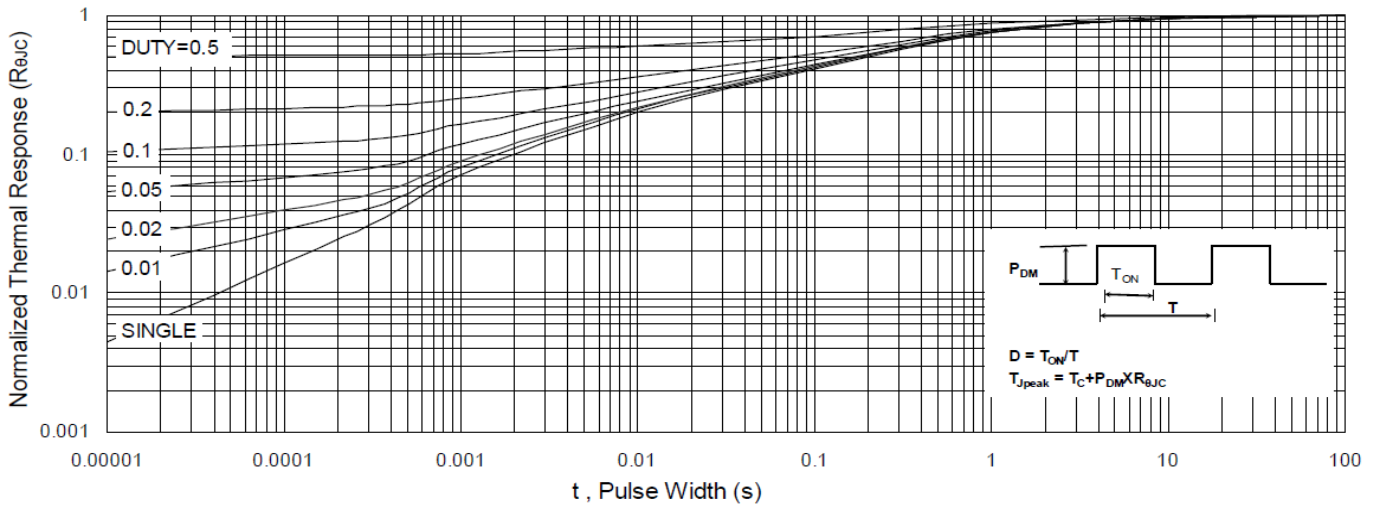
**TYPICAL CHARACTERISTICS CURVE**



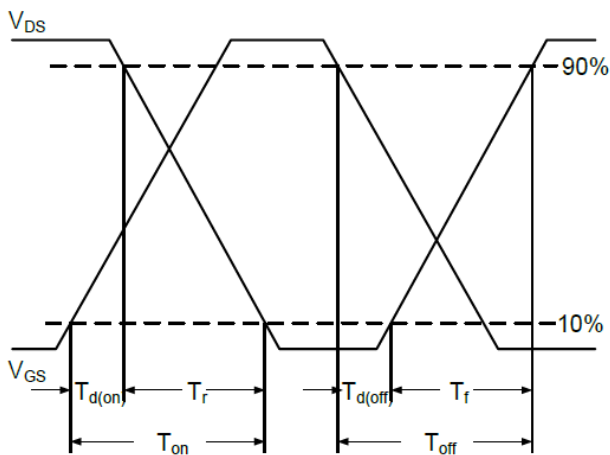
**Fig.7 Capacitance**



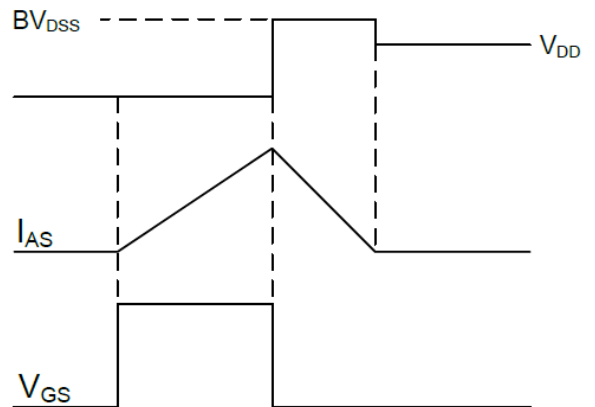
**Fig.8 Safe Operating Area**



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



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Waveform**