

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

## DESCRIPTION

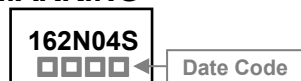
The SSU162N04S-C is the highest performance trench N-Ch MOSFETs with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The SSU162N04S-C meet the RoHS and Green Product requirement with full function reliability approved.

## FEATURES

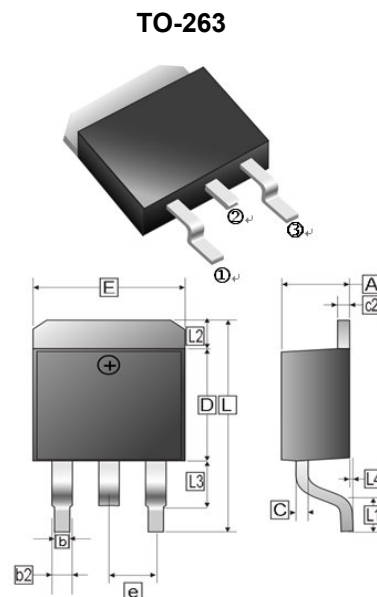
- High Speed Power Switching
- Super Low Gate Charge
- Green Device Available

## MARKING



## PACKAGE INFORMATION

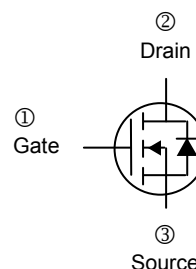
| Package | MPQ  | Leader Size |
|---------|------|-------------|
| TO-263  | 0.8K | 13 inch     |



| REF. | Millimeter |       | REF. | Millimeter |      |
|------|------------|-------|------|------------|------|
|      | Min.       | Max.  |      | Min.       | Max. |
| A    | 4.00       | 4.87  | c2   | 1.07       | 1.65 |
| b    | 0.51       | 1.01  | b2   | 1.34       | REF  |
| L4   | 0.00       | 0.30  | D    | 8.0        | 9.65 |
| C    | 0.30       | 0.74  | e    | 2.54       | REF  |
| L3   | 1.50       | REF   | L    | 14.6       | 16.1 |
| L1   | 2.5        | REF   | L2   | 1.27       | REF  |
| E    | 9.60       | 10.67 |      |            |      |

## ORDER INFORMATION

| Part Number  | Type                            |
|--------------|---------------------------------|
| SSU162N04S-C | Lead (Pb)-free and Halogen-free |



## ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ unless otherwise specified)

| Parameter   | Symbol          | Rating                  | Unit                        |
|---|-----------------|-------------------------|-----------------------------|
| Drain-Source Voltage  | $V_{DS}$        | 40                      | V                           |
| Gate-Source Voltage   | $V_{GS}$        | $\pm 20$                | V                           |
| Continuous Drain Current <sup>1</sup> @ $V_{GS}=10\text{V}$ | $I_D$           | $T_C=25^\circ\text{C}$  | 162                         |
|   |                 | $T_C=100^\circ\text{C}$ | 102                         |
| Pulsed Drain Current <sup>2</sup>                           | $I_{DM}$        | 320                     | A                           |
| Power Dissipation <sup>3</sup>                              | $P_D$           | 111.6                   | W                           |
| Operating Junction and Storage Temperature                  | $T_J, T_{STG}$  | -55~150                 | $^\circ\text{C}$            |
| <b>Thermal Resistance Rating</b>                            |                 |                         |                             |
| Thermal Resistance Junction-Ambient <sup>1</sup>            | $R_{\theta JA}$ | 62                      | $^\circ\text{C} / \text{W}$ |
| Thermal Resistance Junction-Case <sup>1</sup>               | $R_{\theta JC}$ | 1.12                    |                             |

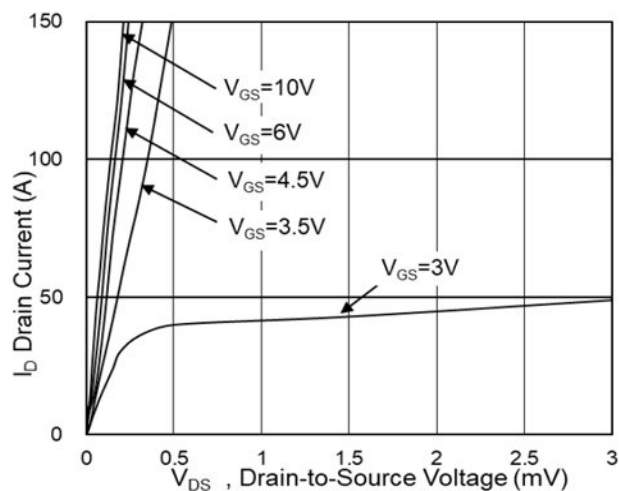
**ELECTRICAL CHARACTERISTICS** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

| Parameter                                      | Symbol        | Min. | Typ. | Max.      | Unit       | Test Conditions  |
|--|---------------|------|------|-----------|------------|--|
| Drain-Source Breakdown Voltage                 | $V_{(BR)DSS}$ | 40   | -    | -         | V          | $V_{GS}=0V, I_D=250\mu A$                                    |
| Gate-Threshold Voltage                         | $V_{GS(th)}$  | 1    | -    | 2.5       | V          | $V_{DS}=V_{GS}, I_D=250\mu A$                                |
| Forward Transconductance                       | $g_{fs}$      | -    | 53   | -         | S          | $V_{DS}=5V, I_D=20A$   |
| Gate-Source Leakage Current                    | $I_{GSS}$     | -    | -    | $\pm 100$ | nA         | $V_{GS}=\pm 20V$   |
| Drain-Source Leakage Current                   | $I_{DSS}$     | -    | -    | 1         | $\mu A$    | $V_{DS}=32V, V_{GS}=0V, T_J=25^\circ\text{C}$                |
|  |               | -    | -    | 5         |            | $V_{DS}=32V, V_{GS}=0V, T_J=55^\circ\text{C}$                |
| Static Drain-Source On-Resistance <sup>2</sup> | $R_{DS(ON)}$  | -    | -    | 2.6       | m $\Omega$ | $V_{GS}=10V, I_D=20A$  |
|  |               | -    | -    | 3.2       |            | $V_{GS}=4.5V, I_D=20A$                                       |
| Total Gate Charge (4.5V)                       | $Q_g$         | -    | 45   | -         | nC         | $I_D=20A$<br>$V_{DS}=15V$<br>$V_{GS}=10V$                    |
| Total Gate Charge                              | $Q_g$         | -    | 88   | -         |            |  |
| Gate-Source Charge                             | $Q_{gs}$      | -    | 12   | -         |            |  |
| Gate-Drain Change                              | $Q_{gd}$      | -    | 18.5 | -         |            |  |
| Turn-on Delay Time                             | $T_{d(on)}$   | -    | 18.5 | -         | nS         | $V_{DD}=15V$<br>$I_D=20A$<br>$V_{GS}=10V$<br>$R_G=3.3\Omega$ |
| Rise Time                                      | $T_r$         | -    | 9    | -         |            |  |
| Turn-off Delay Time                            | $T_{d(off)}$  | -    | 58.5 | -         |            |  |
| Fall Time                                      | $T_f$         | -    | 32   | -         |            |  |
| Input Capacitance                              | $C_{iss}$     | -    | 3972 | -         | pF         | $V_{GS}=0V$<br>$V_{DS}=25V$<br>$f=1\text{MHz}$               |
| Output Capacitance                             | $C_{oss}$     | -    | 896  | -         |            |  |
| Reverse Transfer Capacitance                   | $C_{rss}$     | -    | 62   | -         |            |  |
| <b>Source-Drain Diode</b>                      |               |      |      |           |            |  |
| Diode Forward Voltage <sup>2</sup>             | $V_{SD}$      | -    | -    | 1.2       | V          | $I_S=1A, V_{GS}=0V$  |
| Continuous Source Current <sup>1</sup>         | $I_S$         | -    | -    | 162       | A          | $V_G=V_D=0$ , Force Current                                  |

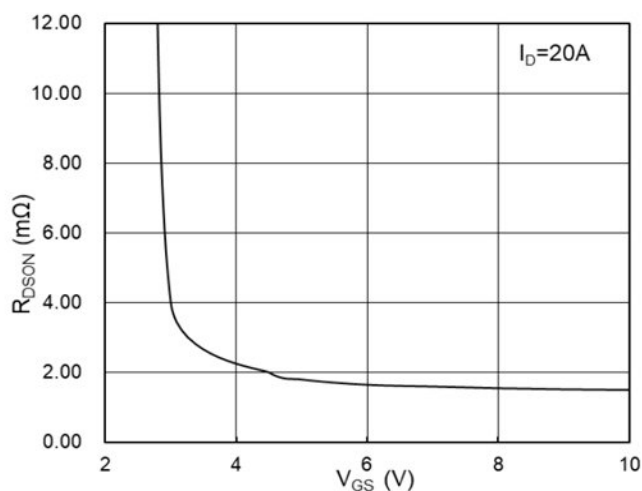
Notes:

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
3. The power dissipation is limited by 150°C junction temperature.

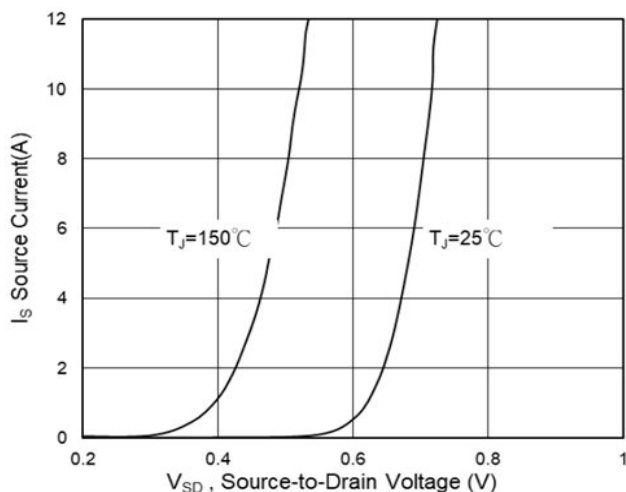
**CHARACTERISTIC CURVES**



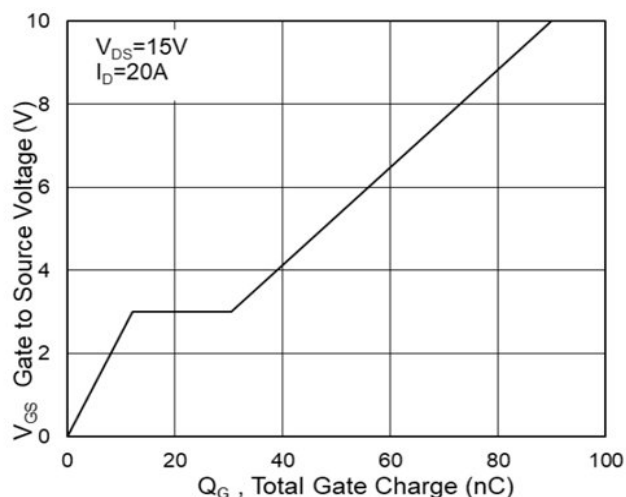
**Fig.1 Typical Output Characteristics**



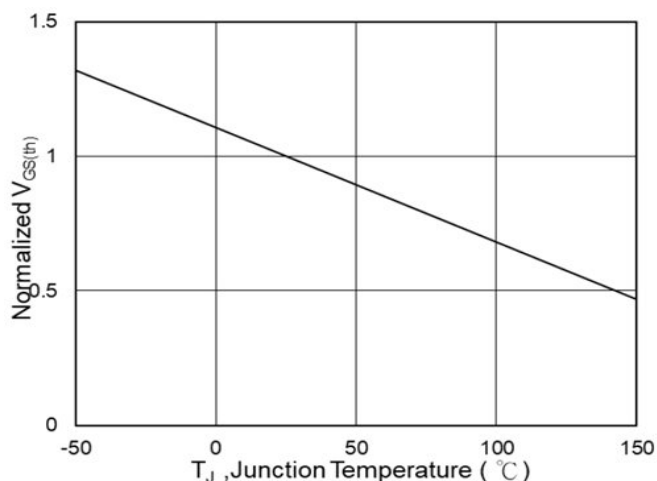
**Fig.2 On-Resistance vs G-S Voltage**



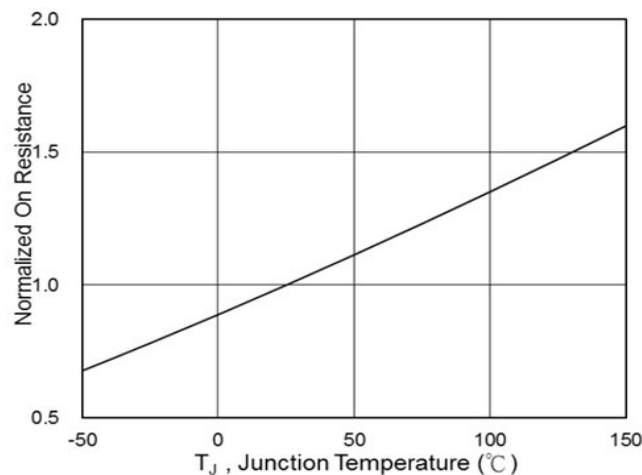
**Fig.3 Source Drain Forward Characteristics**



**Fig.4 Gate-Charge Characteristics**

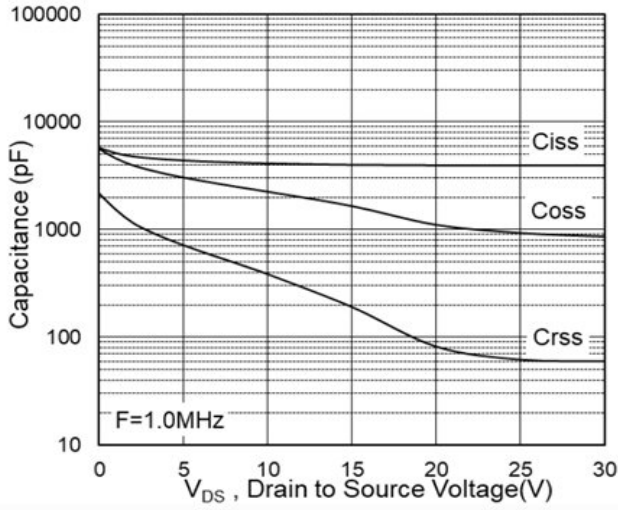


**Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$**

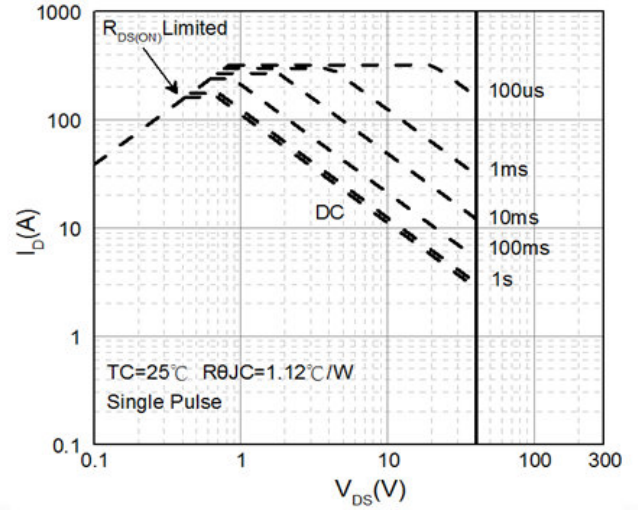


**Fig.6 Normalized  $R_{DS(ON)}$  vs  $T_J$**

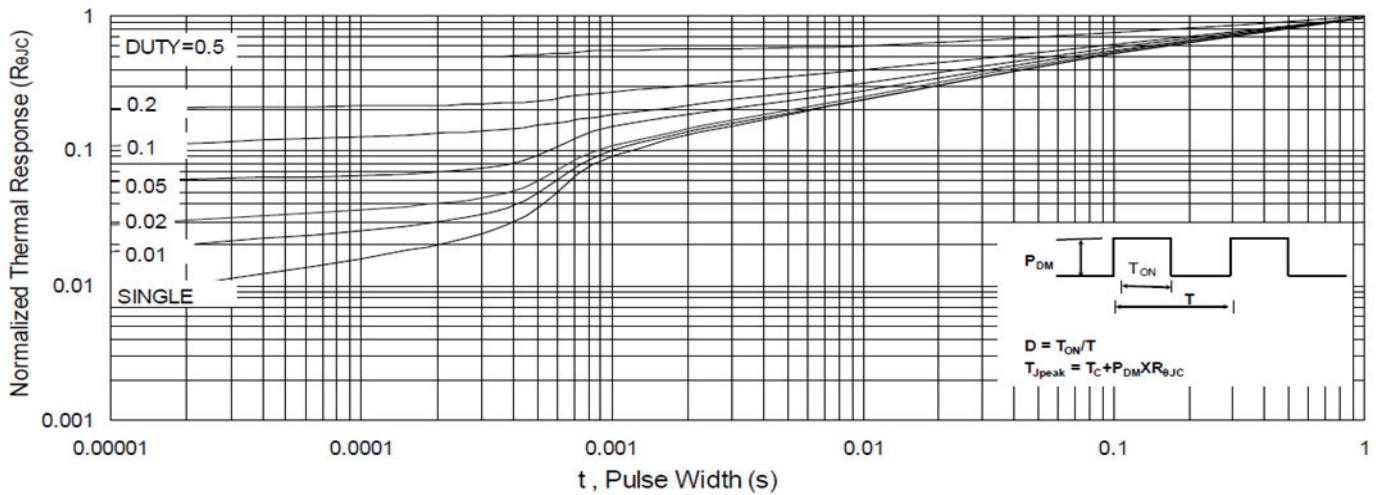
**CHARACTERISTIC CURVES**



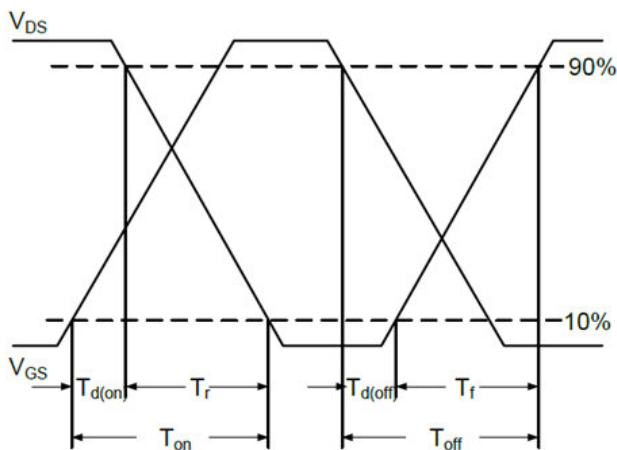
**Fig.7 Capacitance**



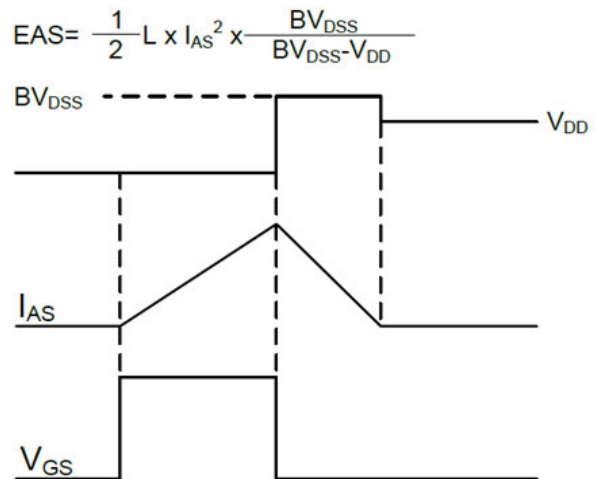
**Fig.8 Safe Operating Area**



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



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**