Elektronische Bauelemente

# SPRD4160-C

**42A, 60V, $R_{DS(ON)}$ 12mΩ**

**Dual N-Ch Enhancement Mode Power MOSFET**

RoHS Compliant Product

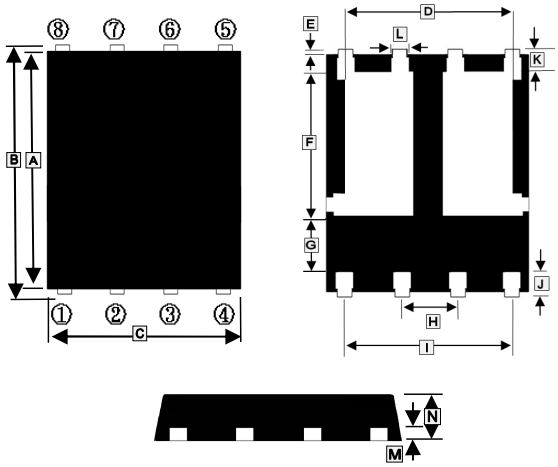
A suffix of "-C" specifies halogen & lead-free

## DESCRIPTION

The SPRD4160-C is the highest performance trench Dual 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 SPRD4160-C meet the RoHS and Green Product requirement with full function reliability approved.

**DFN5x6-8D**

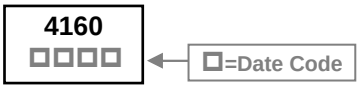



| REF. | Millimeter | | REF. | Millimeter | |
|---|---|---|---|---|---|
| | Min. | Max. | | Min. | Max. |
| A | 5.70 | 5.80 | H | 1.27 BSC. | |
| B | 5.90 | 6.10 | I | 3.61 | 3.96 |
| C | 4.80 | 5.00 | J | 0.51 | 0.71 |
| D | 3.61 | 3.96 | K | 0.41 | 0.61 |
| E | 0.06 | 0.20 | L | 0.33 | 0.51 |
| F | 3.38 | 3.78 | M | 0.20 | 0.30 |
| G | 1.10 | - | N | 0.90 | 1.10 |

## FEATURES

- Advanced High Cell Density Trench Technology
- Super Low Gate Charge
- Green Device Available

## MARKING

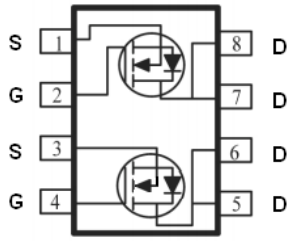



## PACKAGE INFORMATION

| Package | MPQ | Leader Size |
|---|---|---|
| DFN5x6-8D | 3K | 13 inch |

## ORDER INFORMATION

| Part Number | Type |
|---|---|
| SPRD4160-C | Lead (Pb)-free and Halogen-free |




## ABSOLUTE MAXIMUM RATINGS

| Parameter | | Symbol | Ratings | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current [1] @$V_{GS}$=10V | $T_C$=25℃ | $I_D$ | 42 | A |
| | $T_C$=100℃ | | 26.5 | |
| Pulsed Drain Current [3] | | $I_{DM}$ | 85 | A |
| Total Power Dissipation | $T_C$=25℃ | $P_D$ | 29.7 | W |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55~150 | ℃ |
| **Thermal Data** | | | | |
| Thermal Resistance Junction-Ambient [1] | | $R_{\theta JA}$ | 62.5 | ℃/W |
| Thermal Resistance Junction-Ambient [2] | | | 110 | |
| Thermal Resistance Junction-Case [1] | | $R_{\theta JC}$ | 4.2 | |

## ELECTRICAL CHARACTERISTICS ($T_J$=25℃ unless otherwise specified)

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | 60 | - | - | V | $V_{GS}$=0, $I_D$=250μA |
| Gate Threshold Voltage | | $V_{GS(th)}$ | 1 | - | 2.5 | V | $V_{DS}$=$V_{GS}$, $I_D$=250μA |
| Forward Transfer Conductance | | $g_{fs}$ | - | 42 | - | S | $V_{DS}$=5V, $I_D$=15A |
| Gate-Source Leakage Current | | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$=±20V |
| Drain-Source Leakage Current | $T_J$=25℃ | $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$=48V, $V_{GS}$=0 |
| | $T_J$=55℃ | | - | - | 5 | | |
| Static Drain-Source On-Resistance [4] | | $R_{DS(ON)}$ | - | 8.2 | 12 | mΩ | $V_{GS}$=10V, $I_D$=15A |
| | | | - | 10.5 | 15 | | $V_{GS}$=4.5V, $I_D$=8A |
| Total Gate Charge | | $Q_g$ | - | 28.7 | - | nC | $I_D$=15A<br>$V_{DS}$=48V<br>$V_{GS}$=4.5V |
| Gate-Source Charge | | $Q_{gs}$ | - | 10.5 | - | | |
| Gate-Drain Change | | $Q_{gd}$ | - | 9.9 | - | | |
| Turn-on Delay Time | | $T_{d(on)}$ | - | 10.4 | - | nS | $V_{DS}$=30V<br>$I_D$=15A<br>$V_{GS}$=10V<br>$R_G$=3.3Ω |
| Rise Time | | $T_r$ | - | 9.2 | - | | |
| Turn-off Delay Time | | $T_{d(off)}$ | - | 63 | - | | |
| Fall Time | | $T_f$ | - | 4.8 | - | | |
| Input Capacitance | | $C_{iss}$ | - | 3240 | - | pF | $V_{GS}$=0<br>$V_{DS}$=15V<br>f=1MHz |
| Output Capacitance | | $C_{oss}$ | - | 210 | - | | |
| Reverse Transfer Capacitance | | $C_{rss}$ | - | 146 | - | | |
| **Source-Drain Diode** | | | | | | | |
| Continuous Source Current [1] | | $I_S$ | - | - | 42 | A | |
| Pulsed Source Current [3] | | $I_{SM}$ | - | - | 85 | | |
| Forward on Voltage [4] | | $V_{SD}$ | - | - | 1.2 | V | $I_S$=1A, $V_{GS}$=0, $T_J$=25℃ |
| Reverse Recovery Time | | $T_{rr}$ | - | 18 | - | nS | $I_F$=15A, dI/dt=100A/μs, $T_J$=25℃ |
| Reverse Recovery Charge | | $Q_{rr}$ | - | 14 | - | nC | |

Notes:
1. Surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper.
2. When mounted on Min. copper pad.
3. Pulse width limited by maximum junction temperature, pulse width≤10μs, duty cycle≤2%.
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

## CHARACTERISTIC CURVES

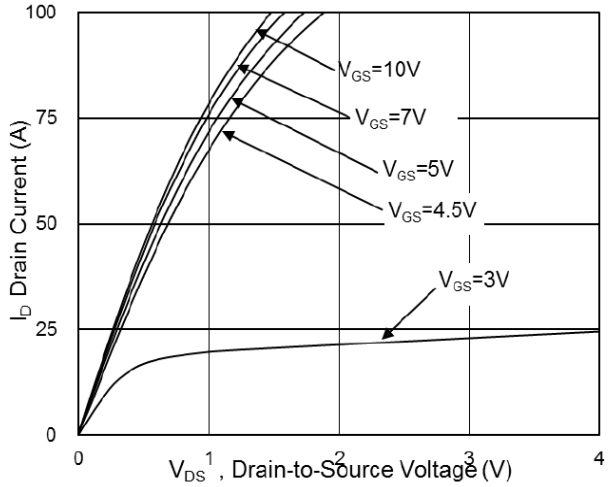



**Fig.1 Typical Output Characteristics**

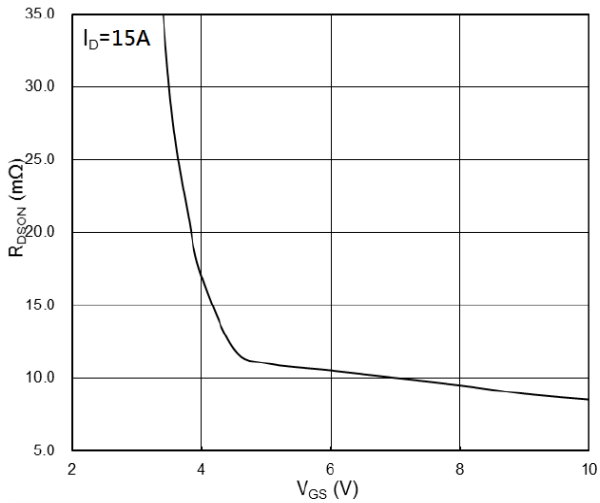



**Fig.2 On-Resistance vs. Gate-Source Voltage**

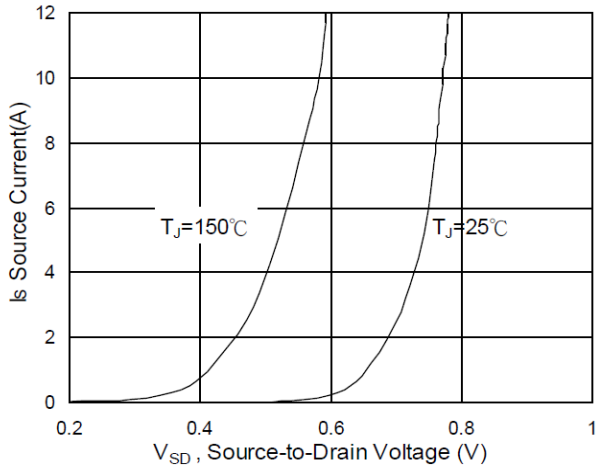



**Fig.3 Forward Characteristics of Reverse**

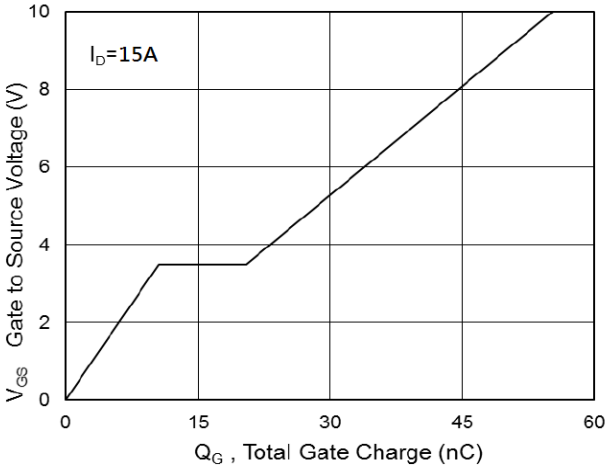



**Fig.4 Gate-Charge Characteristics**

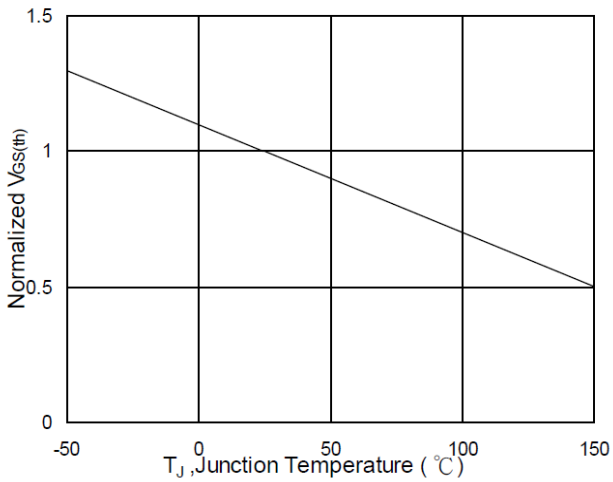



**Fig.5 Normalized $V_{GS(th)}$ vs. $T_J$**

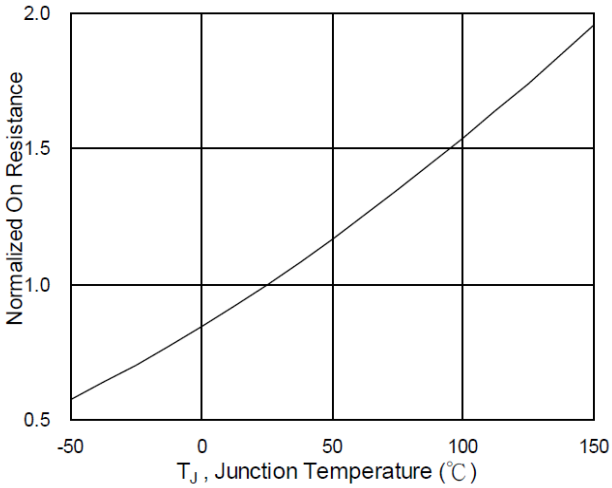



**Fig.6 Normalized $R_{DSON}$ vs. $T_J$**

## CHARACTERISTIC CURVES

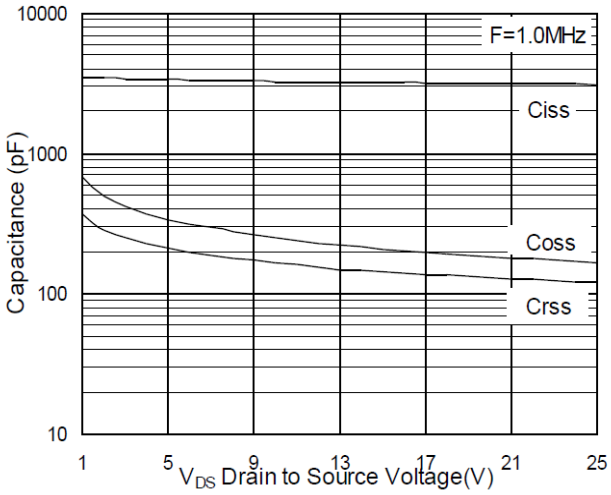



Fig.7 Capacitance

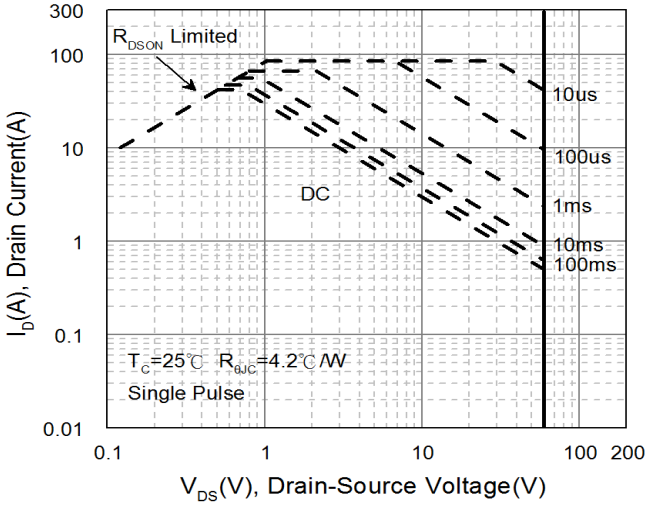



Fig.8 Safe Operating Area

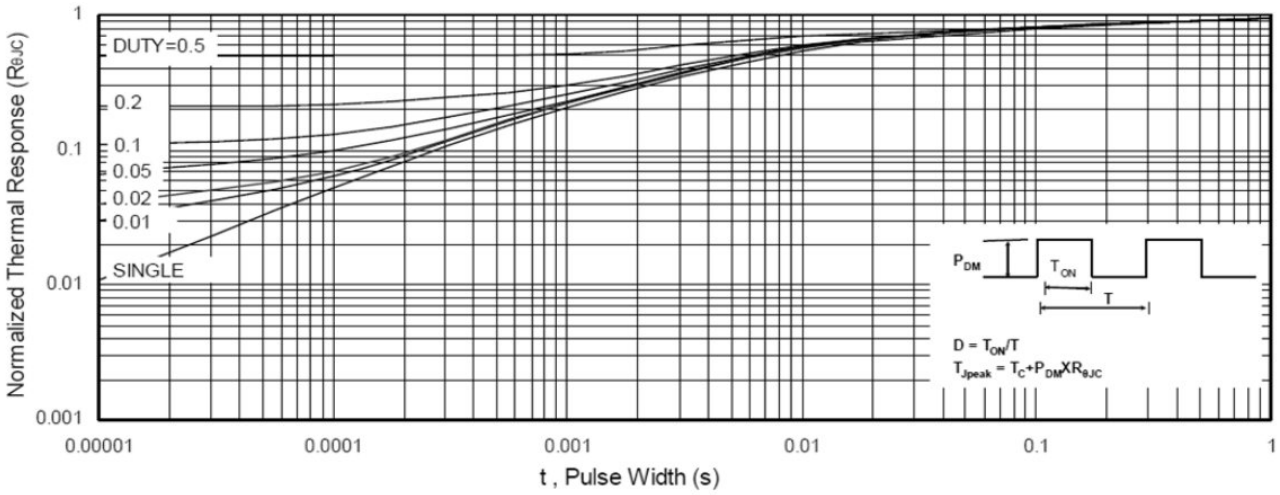



Fig.9 Normalized Maximum Transient Thermal Impedance

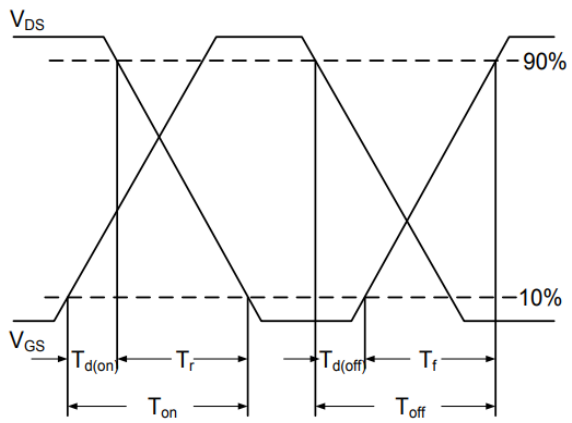



Fig.10 Switching Time Waveform

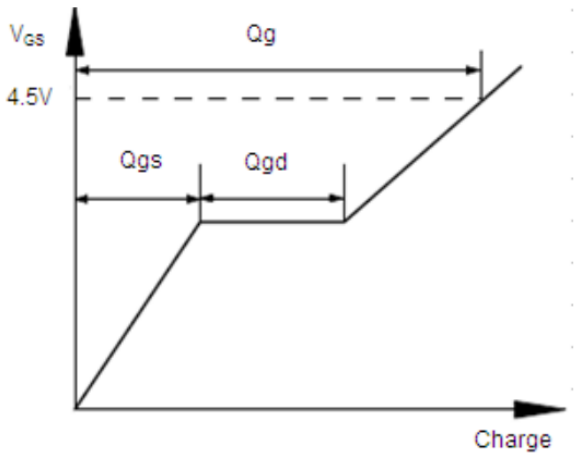



Fig.11 Gate Charge Waveform