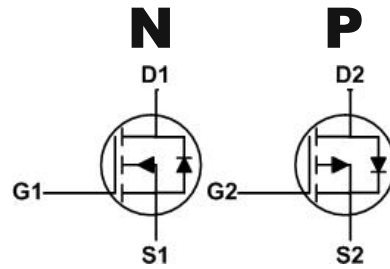




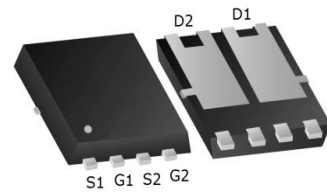
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

### Description

The WLQ30G20D is the high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications . The WLQ30G20D meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.



### PDFN3333-8L Pin Configuration



### Product Summary

| BVDSS | RDSON | ID   |
|-------|-------|------|
| 30V   | 14 mΩ | 16A  |
| -30V  | 25 mΩ | -14A |

### Absolute Maximum Ratings

| Symbol                | Parameter                                  | Rating     |            | Units      |
|-----------------------|--|------------|------------|------------|
|                       |  | N-Ch       | P-Ch       |            |
| $V_{DS}$              | Drain-Source Voltage                       | 30         | -30        | V          |
| $V_{GS}$              | Gate-Source Voltage                        | $\pm 20$   | $\pm 20$   | V          |
| $I_D@T_C=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 16         | -14        | A          |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 5          | -4         | A          |
| $I_D@T_A=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 2.3        | -1.8       | A          |
| $I_D@T_A=70^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 1.8        | -1.5       | A          |
| $I_{DM}$              | Pulsed Drain Current <sup>2</sup>          | 40         | -40        | A          |
| EAS                   | Single Pulse Avalanche Energy <sup>3</sup> | 26.6       | 110        | mJ         |
| $I_{AS}$              | Avalanche Current                          | 8.7        | -20        | A          |
| $P_D@T_C=25^\circ C$  | Total Power Dissipation <sup>4</sup>       | 10.8       | 10.8       | W          |
| $P_D@T_A=25^\circ C$  | Total Power Dissipation <sup>4</sup>       | 2          | 2          | W          |
| $T_{STG}$             | Storage Temperature Range                  | -55 to 150 | -55 to 150 | $^\circ C$ |
| $T_J$                 | Operating Junction Temperature Range       | -55 to 150 | -55 to 150 | $^\circ C$ |

### Thermal Data

| Symbol          | Parameter  | Typ. | Max. | Unit         |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup> | ---  | 62   | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 6    | $^\circ C/W$ |



### N-Channel Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

| Symbol                              | Parameter                                      | Conditions   | Min. | Typ.  | Max. | Unit  |
|-------------------------------------|--|--|------|-------|------|-------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA   | 30   | ---   | ---  | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | BVDSS Temperature Coefficient                  | Reference to 25°C, I <sub>D</sub> =1mA   | ---  | 0.023 | ---  | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =10A  | ---  | 14    | 20   | mΩ    |
|                                     |  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A  | ---  | 20    | 25   |       |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                               | 1.0  | ---   | 2.5  | V     |
| ΔV <sub>GS(th)</sub>                | V <sub>GS(th)</sub> Temperature Coefficient    |  | ---  | -4.2  | ---  | mV/°C |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current                   | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                        | ---  | ---   | 1    | uA    |
|                                     |  | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                        | ---  | ---   | 5    |       |
| I <sub>GSS</sub>                    | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V   | ---  | ---   | ±100 | nA    |
| g <sub>fs</sub>                     | Forward Transconductance                       | V <sub>DS</sub> =5V, I <sub>D</sub> =10A   | ---  | 14    | ---  | S     |
| R <sub>g</sub>                      | Gate Resistance                                | V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz                                       | ---  | 2.3   | ---  | Ω     |
| Q <sub>g</sub>                      | Total Gate Charge (4.5V)                       | V <sub>DS</sub> =20V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A                       | ---  | 5     | ---  | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                             |  | ---  | 1.11  | ---  |       |
| Q <sub>gd</sub>                     | Gate-Drain Charge                              |  | ---  | 2.61  | ---  |       |
| T <sub>d(on)</sub>                  | Turn-On Delay Time                             | V <sub>DD</sub> =12V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω<br>I <sub>D</sub> =6A | ---  | 7.7   | ---  | ns    |
| T <sub>r</sub>                      | Rise Time                                      |  | ---  | 46    | ---  |       |
| T <sub>d(off)</sub>                 | Turn-Off Delay Time                            |  | ---  | 11    | ---  |       |
| T <sub>f</sub>                      | Fall Time                                      |  | ---  | 3.6   | ---  |       |
| C <sub>iss</sub>                    | Input Capacitance                              | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                      | ---  | 416   | ---  | pF    |
| C <sub>oss</sub>                    | Output Capacitance                             |  | ---  | 62    | ---  |       |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                   |  | ---  | 51    | ---  |       |

### Diode Characteristics

| Symbol          | Parameter                                | Conditions  | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current <sup>1,5</sup> | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current             | ---  | ---  | 16   | A    |
| I <sub>SM</sub> | Pulsed Source Current <sup>2,5</sup>     |   | ---  | ---  | 30   | A    |
| V <sub>SD</sub> | Diode Forward Voltage <sup>2</sup>       | V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C | ---  | ---  | 1.2  | V    |

Note :

- 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 ≤ 300us, duty cycle ≤ 2%
- 3.The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=12.7A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.



### P-Channel Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)

| Symbol                       | Parameter                                      | Conditions  | Min. | Typ.   | Max.      | Unit                       |
|------------------------------|--|---|------|--------|-----------|----------------------------|
| $BV_{DSS}$                   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V, I_D=-250\mu A$                          | -30  | ---    | ---       | V                          |
| $\Delta BV_{DSS}/\Delta T_J$ | $BV_{DSS}$ Temperature Coefficient             | Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$ | ---  | -0.021 | ---       | $V/^\circ\text{C}$         |
| $R_{DS(ON)}$                 | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=-10V, I_D=-8A$                              | ---  | 25     | 30        | m $\Omega$                 |
|                              |  | $V_{GS}=-4.5V, I_D=-6A$                             | ---  | 30     | 35        |                            |
| $V_{GS(th)}$                 | Gate Threshold Voltage                         | $V_{GS}=V_{DS}, I_D=-250\mu A$                      | -1.0 | ---    | -2.5      | V                          |
| $\Delta V_{GS(th)}$          | $V_{GS(th)}$ Temperature Coefficient           |   | ---  | -4.2   | ---       | $\text{mV}/^\circ\text{C}$ |
| $I_{DSS}$                    | Drain-Source Leakage Current                   | $V_{DS}=-24V, V_{GS}=0V, T_J=25^\circ\text{C}$      | ---  | ---    | 1         | $\mu A$                    |
|                              |  | $V_{DS}=-24V, V_{GS}=0V, T_J=55^\circ\text{C}$      | ---  | ---    | 5         |                            |
| $I_{GSS}$                    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V, V_{DS}=0V$                         | ---  | ---    | $\pm 100$ | nA                         |
| gfs                          | Forward Transconductance                       | $V_{DS}=-5V, I_D=-8A$                               | ---  | 12.6   | ---       | S                          |
| $R_g$                        | Gate Resistance                                | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$               | ---  | 15     | ---       | $\Omega$                   |
| $Q_g$                        | Total Gate Charge (-4.5V)                      | $V_{DS}=-20V, V_{GS}=-4.5V, I_D=-6A$                | ---  | 9.8    | ---       | nC                         |
| $Q_{gs}$                     | Gate-Source Charge                             |   | ---  | 2.2    | ---       |                            |
| $Q_{gd}$                     | Gate-Drain Charge                              |   | ---  | 3.4    | ---       |                            |
| $T_{d(on)}$                  | Turn-On Delay Time                             | $V_{DD}=-24V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-1A$  | ---  | 16.4   | ---       | ns                         |
| $T_r$                        | Rise Time                                      |   | ---  | 20.2   | ---       |                            |
| $T_{d(off)}$                 | Turn-Off Delay Time                            |   | ---  | 55     | ---       |                            |
| $T_f$                        | Fall Time                                      |   | ---  | 10     | ---       |                            |
| $C_{iss}$                    | Input Capacitance                              | $V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$             | ---  | 930    | ---       | pF                         |
| $C_{oss}$                    | Output Capacitance                             |   | ---  | 148    | ---       |                            |
| $C_{rss}$                    | Reverse Transfer Capacitance                   |   | ---  | 115    | ---       |                            |

### Diode Characteristics

| Symbol   | Parameter                                | Conditions                                 | Min. | Typ. | Max. | Unit |
|----------|--|--|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,5</sup> | $V_G=V_D=0V$ , Force Current               | ---  | ---  | -14  | A    |
| $I_{SM}$ | Pulsed Source Current <sup>2,5</sup>     |  | ---  | ---  | -24  | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$ | ---  | ---  | -1.2 | V    |

Note :

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 EAS data shows Max. rating. The test condition is  $V_{DD}=-25V, V_{GS}=-10V, L=0.1\text{mH}, I_{AS}=-30A$
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.



### N-Channel Typical Characteristics

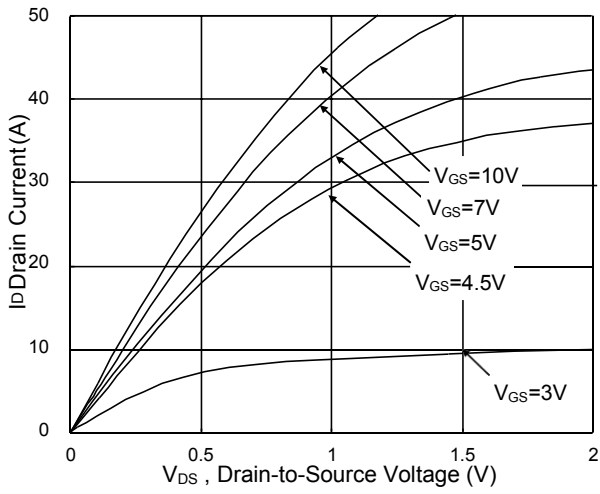


Fig.1 Typical Output Characteristics

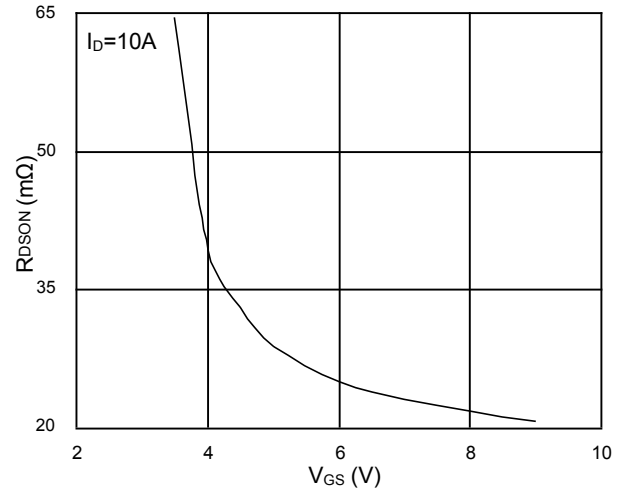


Fig.2 On-Resistance vs. Gate-Source

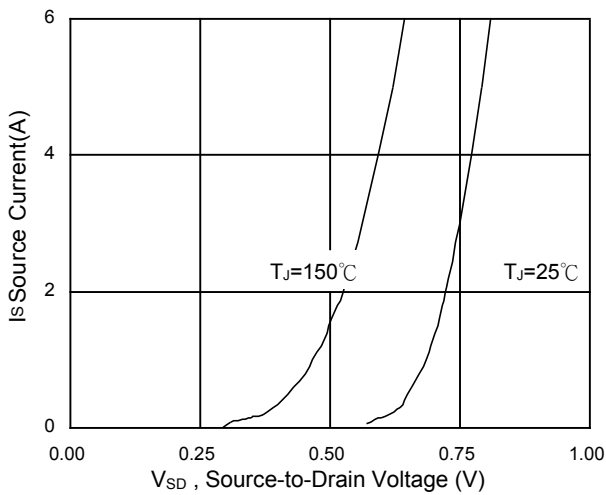


Fig.3 Forward Characteristics Of Reverse

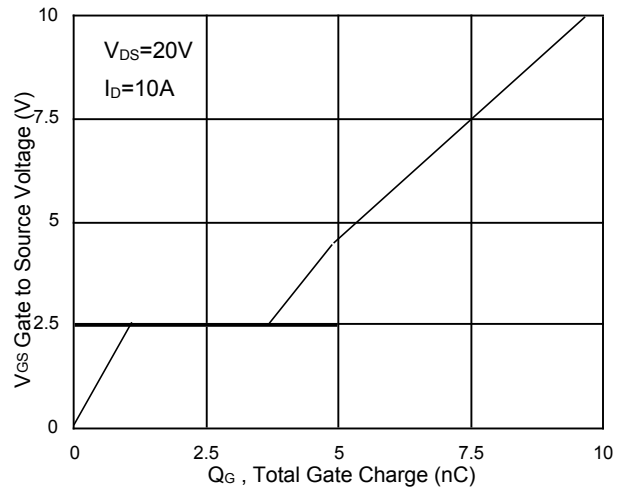


Fig.4 Gate-Charge Characteristics

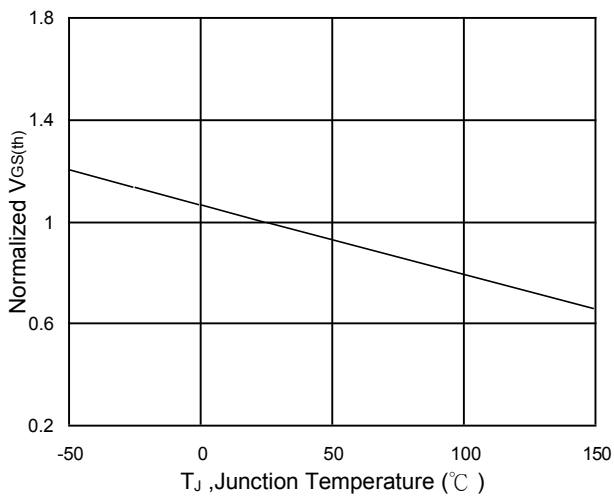


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

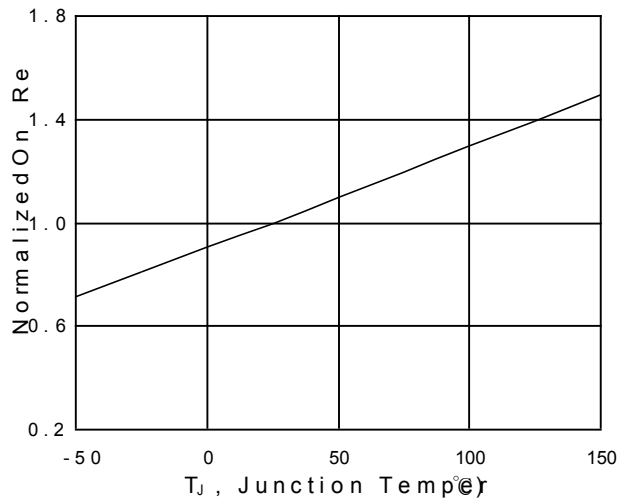
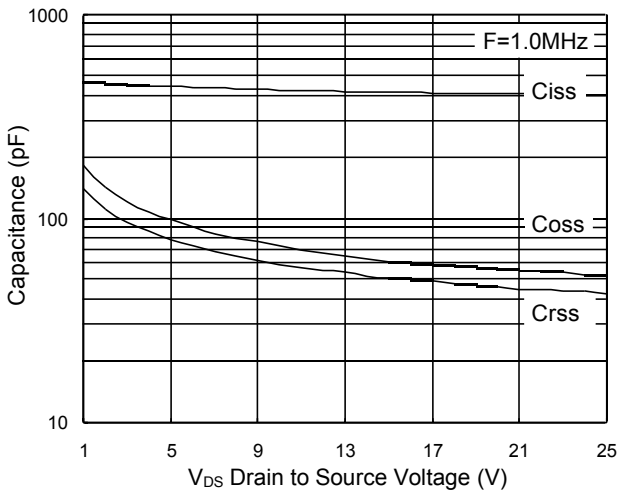
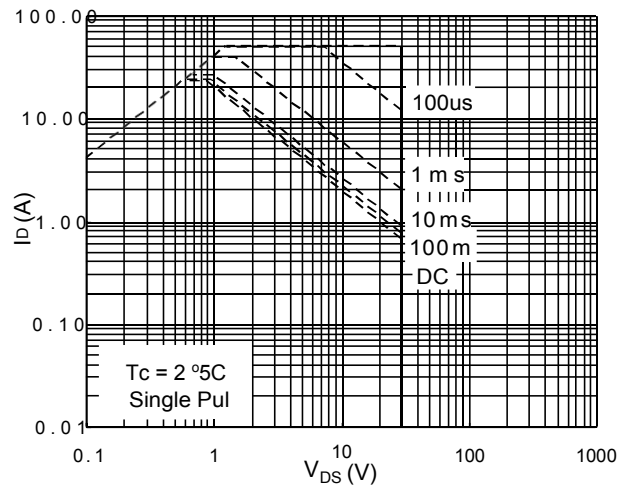


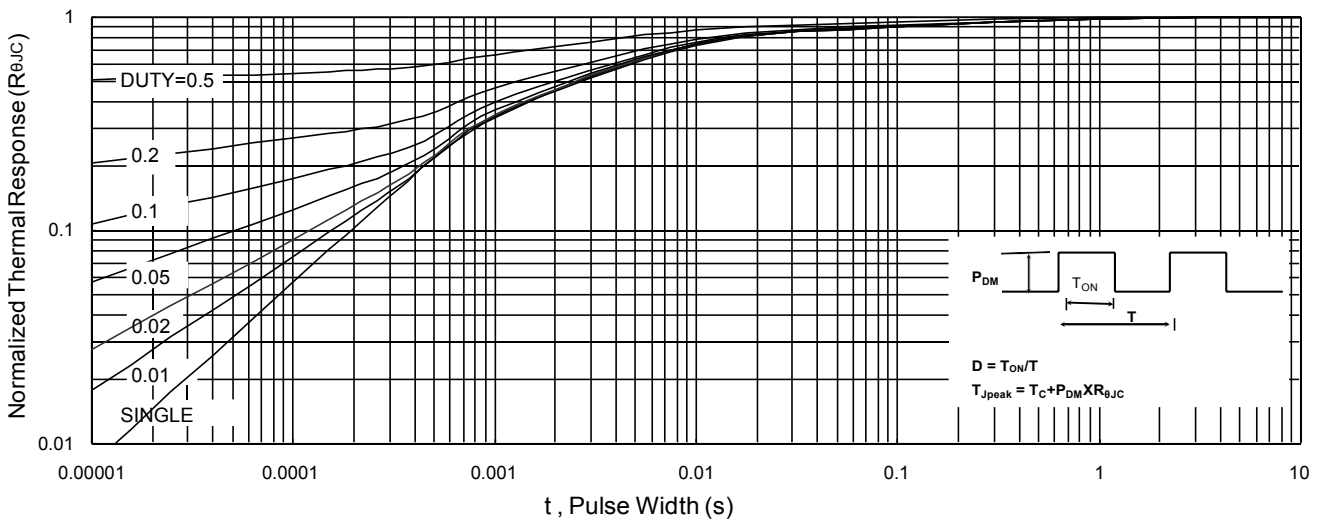
Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$



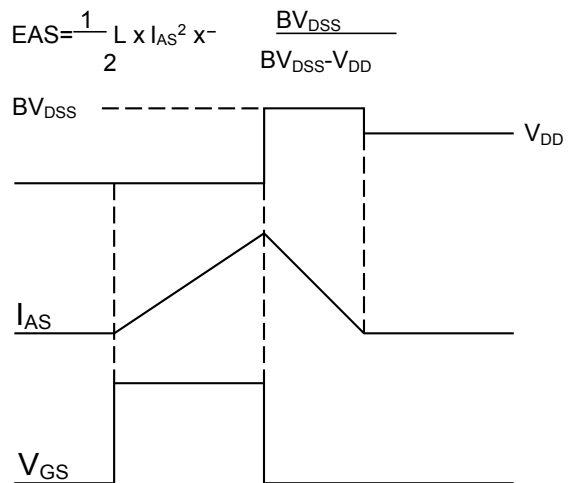
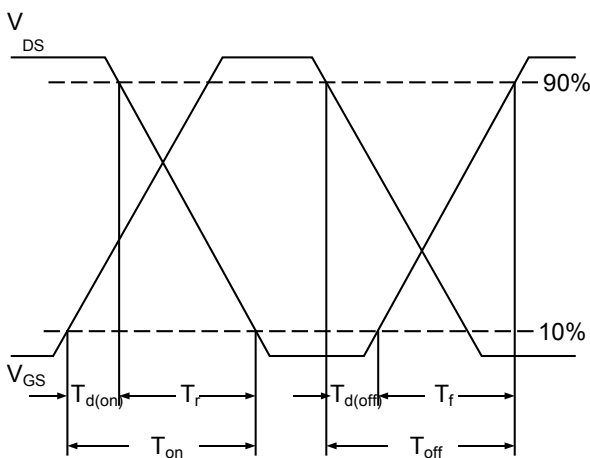
**Fig.7 Capacitance**



**Fig.8 Safe Operating Area**



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





### P-Channel Typical Characteristics

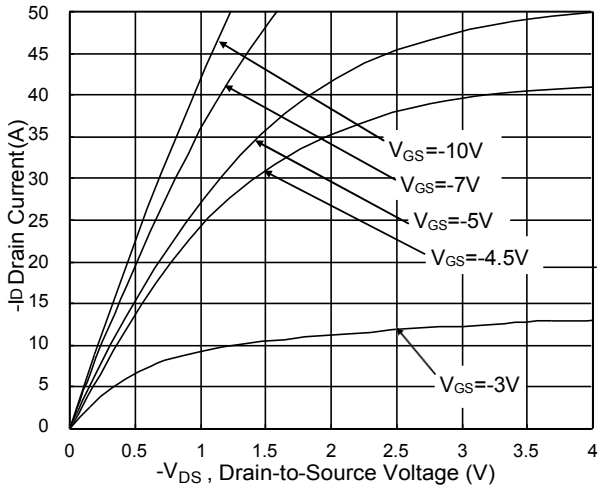


Fig.1 Typical Output Characteristics

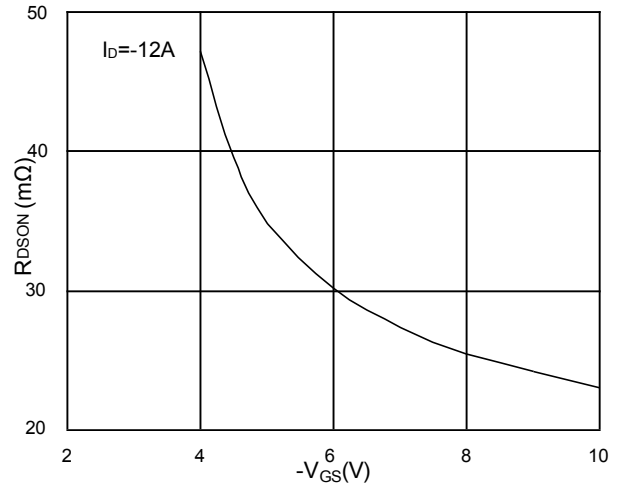


Fig.2 On-Resistance v.s Gate-Source

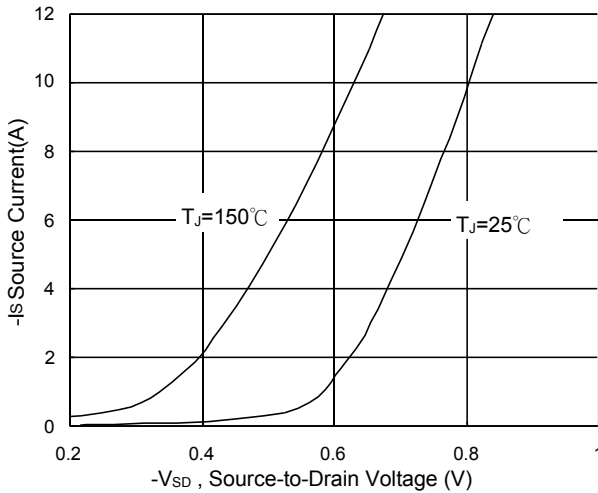


Fig.3 Forward Characteristics Of Reverse

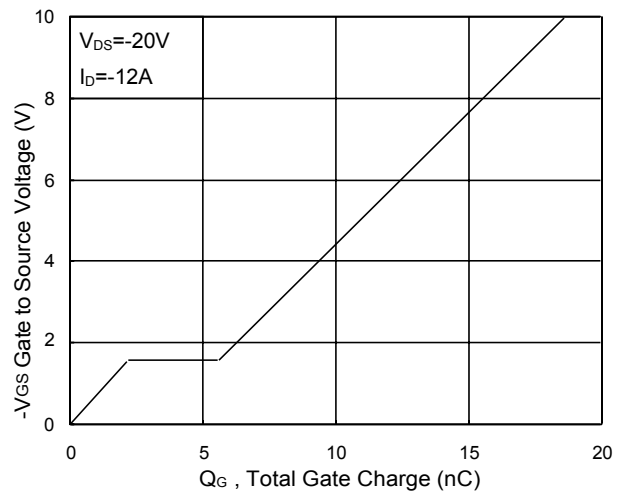


Fig.4 Gate-Charge Characteristics

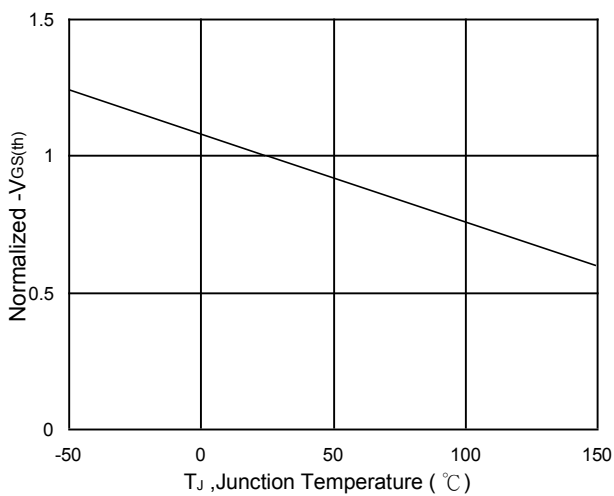


Fig.5 Normalized  $V_{GS(th)}$  v.s  $T_J$

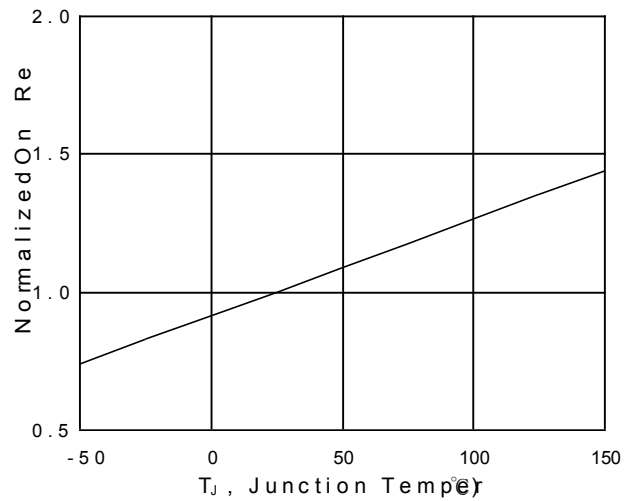
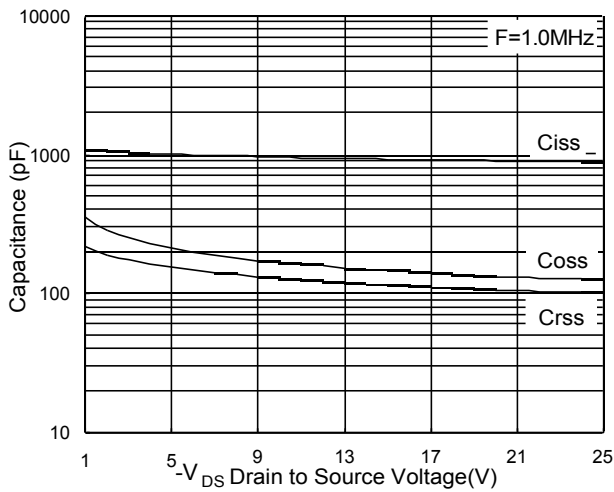
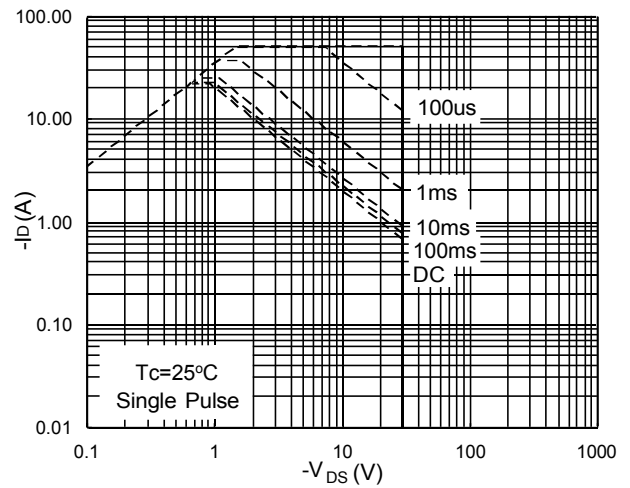


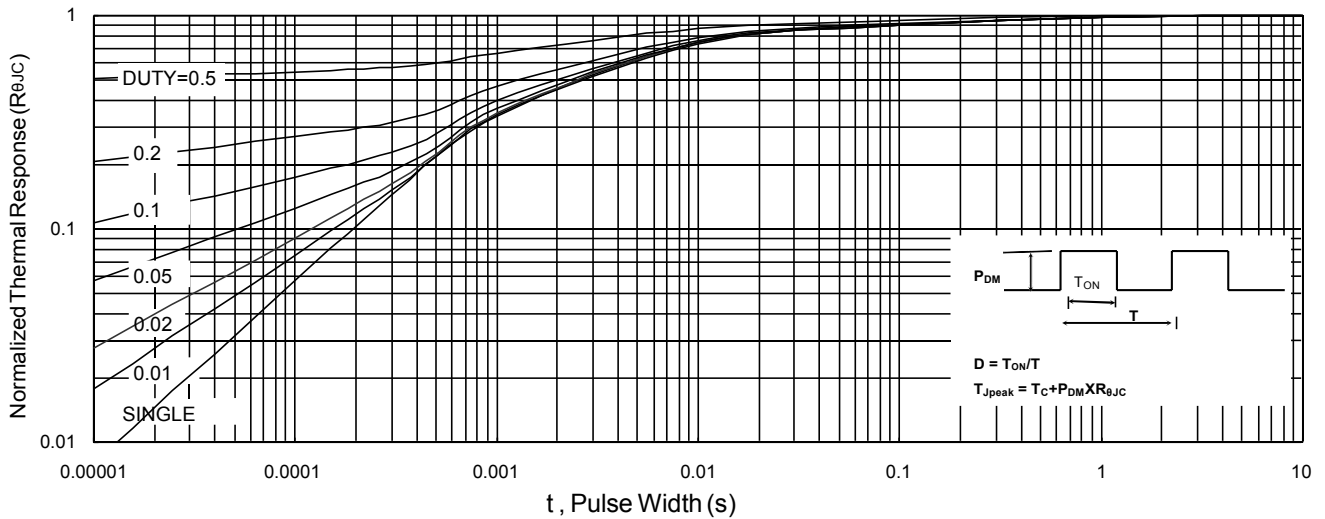
Fig.6 Normalized  $R_{DS(on)}$  v.s  $T_J$



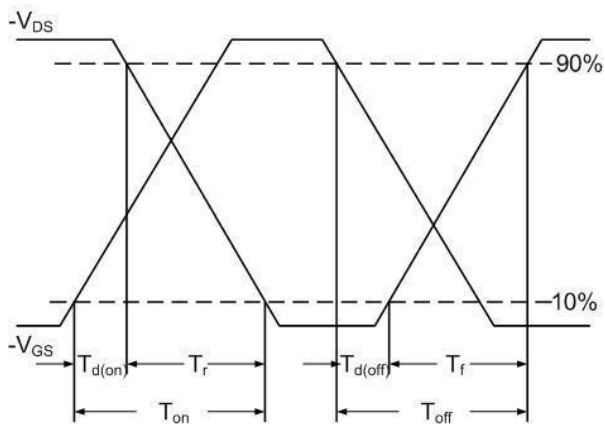
**Fig.7 Capacitance**



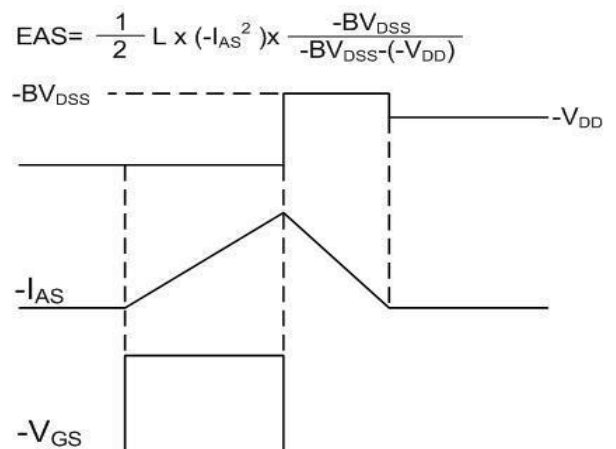
**Fig.8 Safe Operating Area**



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



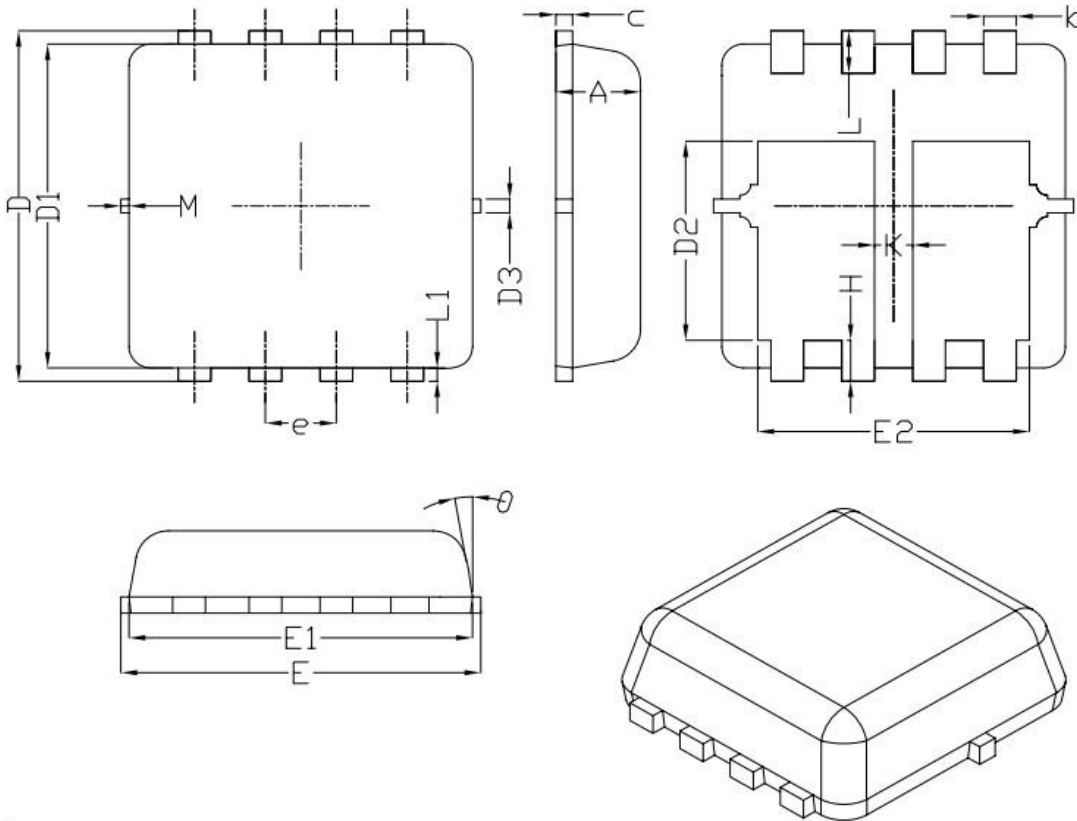
**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**



### Dual PDFN3333-8L Package Outline Data



| Symbol          | Dimensions (unit: mm) |      |      |
|-----------------|-----------------------|------|------|
|                 | Min                   | Typ  | Max  |
| A               | 0.70                  | 0.75 | 0.80 |
| b               | 0.25                  | 0.30 | 0.35 |
| c               | 0.10                  | 0.15 | 0.25 |
| D               | 3.25                  | 3.35 | 3.45 |
| D1              | 3.00                  | 3.10 | 3.20 |
| D2              | 1.78                  | 1.88 | 1.98 |
| D3              | --                    | 0.13 | --   |
| E               | 3.20                  | 3.30 | 3.40 |
| E1              | 3.00                  | 3.15 | 3.20 |
| E2              | 2.39                  | 2.49 | 2.59 |
| e               | 0.65 BSC              |      |      |
| H               | 0.30                  | 0.39 | 0.50 |
| L               | 0.30                  | 0.40 | 0.50 |
| L1              | --                    | 0.13 | --   |
| K               | 0.30                  | --   | --   |
| θ               | --                    | 10°  | 12°  |
| M               | *                     | *    | 0.15 |
| * Not Specified |                       |      |      |

Notes:

1. Refer to JEDEC MO-240 variation CA.
2. Dimensions "D1" and "E1" do NOT include mold flash protrusions or gate burrs.
3. Dimensions "D1" and "E1" include interterminal flash or protrusion.



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