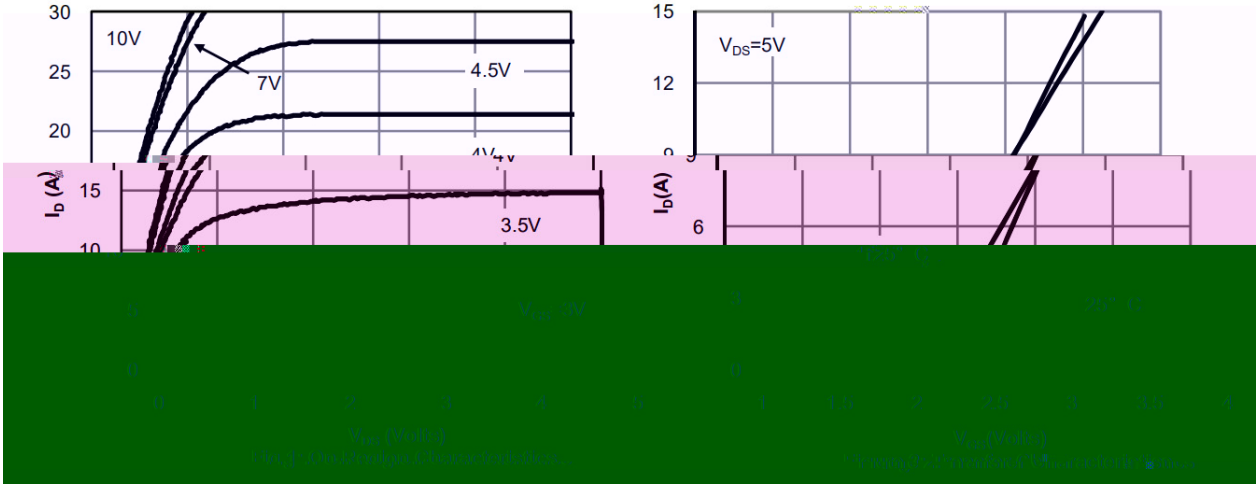
## / Absolute Maximum Ratings(Ta=25 )

| Parameter | Symbol | Rating | | Unit |
|---|---|---|---|---|
| | | N-channe | P-channell | |
| Drain-Source Voltage | $V_{DSS}$ | ±30 | | V |
| Gate-Source Voltage | $V_{GSS}$ | ±20 | | V |
| Continuous Drain Current | $I_D$ ($T_C$=25℃) | 20 | -12 | A |
| Continuous Drain Current | $I_D$ ($T_A$=25℃) | 7.7 | -4.3 | A |
| Power Dissipation | $P_D$ ($T_C$=25 ) | 11.2 | 10 | W |
| Power Dissipation | $P_D$ ($T_A$=25 ) | 2.7 | 1.8 | W |
| Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 to +150 | | |
| Maximum Junction-to-Ambient | $R_{\theta JA}$(Steady-State) | 45 | | /W |
| Maximum Junction-to-Case | $R_{\theta JC}$(Steady-State) | 11.2 | 12.5 | /W |

## N- /N-CHANNEL Electrical Characteristics(Ta=25 )

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250 A | 30 | 35 | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V $V_{GS}$=0V | | | 1.0 | A |
| | | $V_{DS}$=30V $V_{GS}$=0V $T_J$=55℃ | | | 5.0 | A |
| Gate-Body leakage current | $I_{GSS}$ | $V_{GS}$=±20V $V_{DS}$=0V | | | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$ $I_D$=250 A | 1.0 | 1.6 | 2.5 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V $I_D$=6.9A | | 20 | 25 | m |
| | | $V_{GS}$=4.5V $I_D$=5.0A | | 28 | 40 | m |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V $I_S$=1.0A | | 0.78 | 1.2 | V |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=25V $V_{GS}$=0V f=1.0MHz | | 690 | | pF |
| Output Capacitance | $C_{oss}$ | | | 200 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 130 | | pF |
| Gate resistance | $R_g$ | $V_{DS}$=0V $V_{GS}$=0V f=1.0MHz | | 2.7 | | |
| Total Gate Charge(10V) | $Q_g$ | $V_{GS}$=10V $V_{DS}$=15V $I_D$=6A | | 5.2 | | nC |
| Total Gate Charge(4.5V) | | | | 2.5 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 0.8 | | nC |
| Gate-Drain Charge | $Q_{gd}$ | | | 1.3 | | nC |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}$=15 V $V_{GS}$=10V $R_L$=2.5 $R_{GEN}$=3 | | 4.5 | | ns |
| Turn-On Rise Time | $t_r$ | | | 2.5 | | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 14.5 | | ns |
| Turn-Off Fall Time | $t_f$ | | | 3.5 | | ns |

## N- / N-CHANNEL Electrical Characteristic Curve



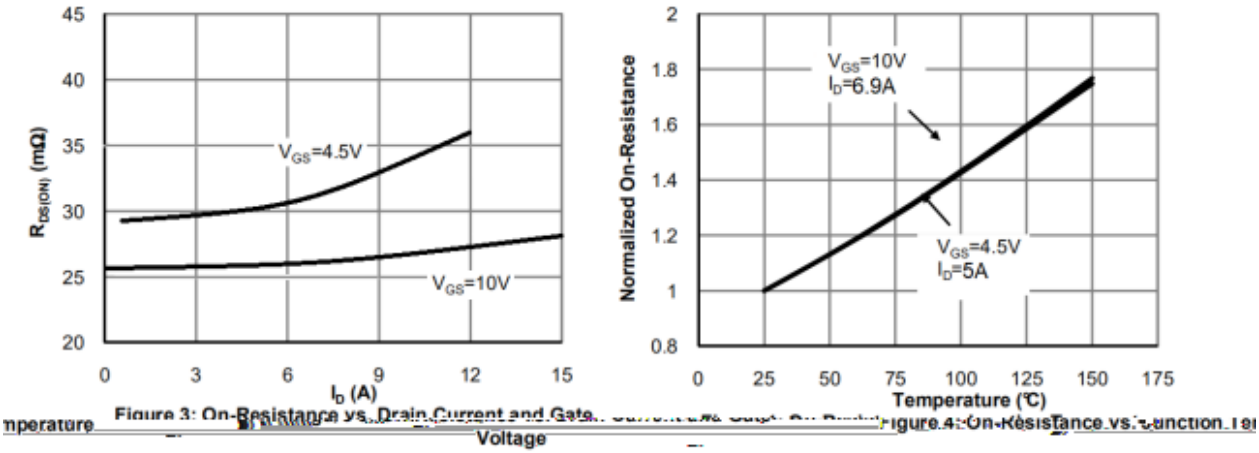
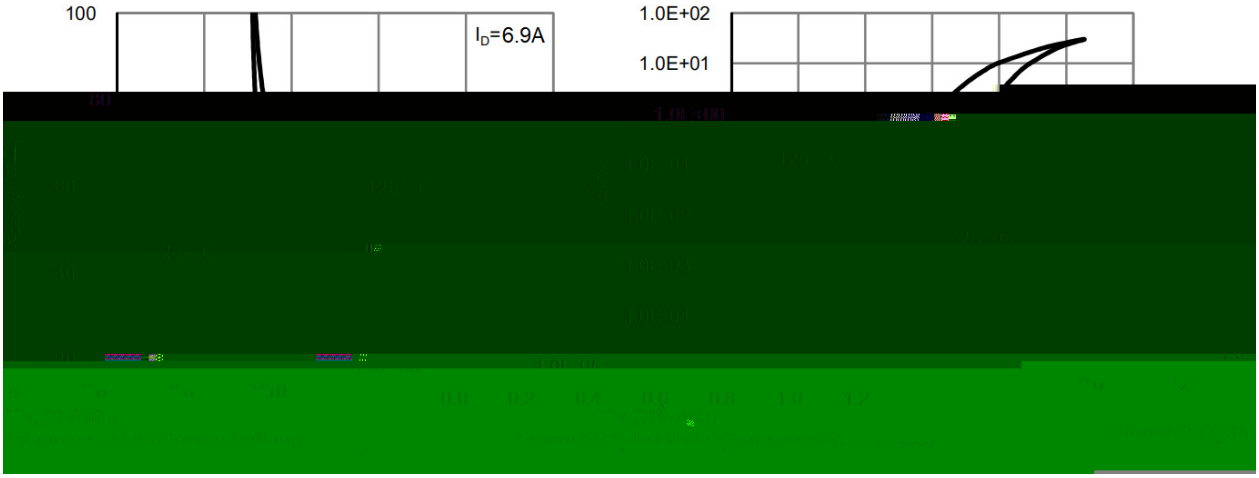
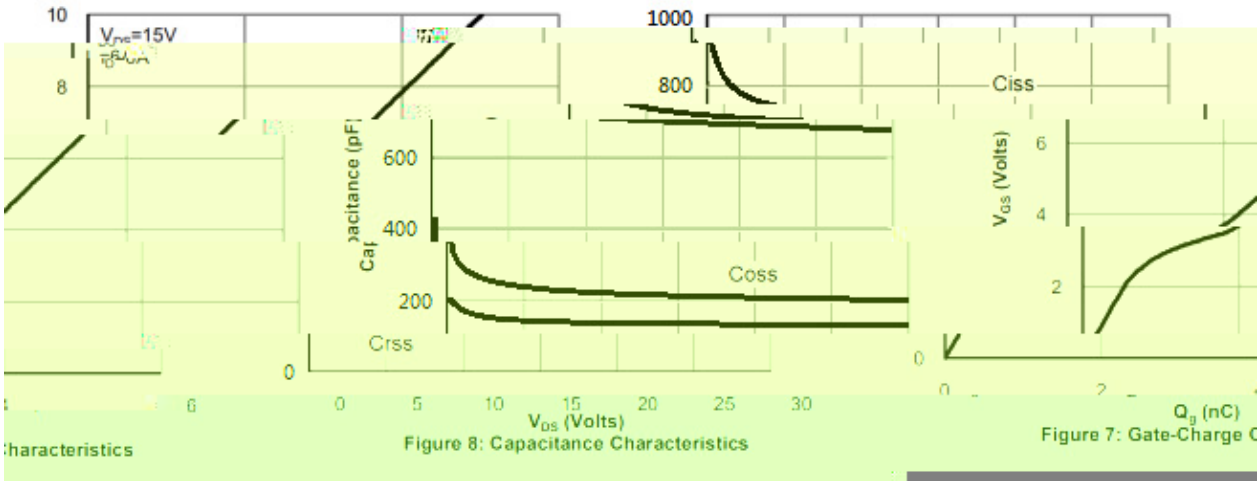




Figure 3: On-Resistance vs. Drain Current and Gate Voltage

Figure 4: On-Resistance vs. Junction Temperature



## N- / N-CHANNEL Electrical Characteristic Curve




haracteristics

Figure 8: Capacitance Characteristics

Figure 7: Gate-Charge C

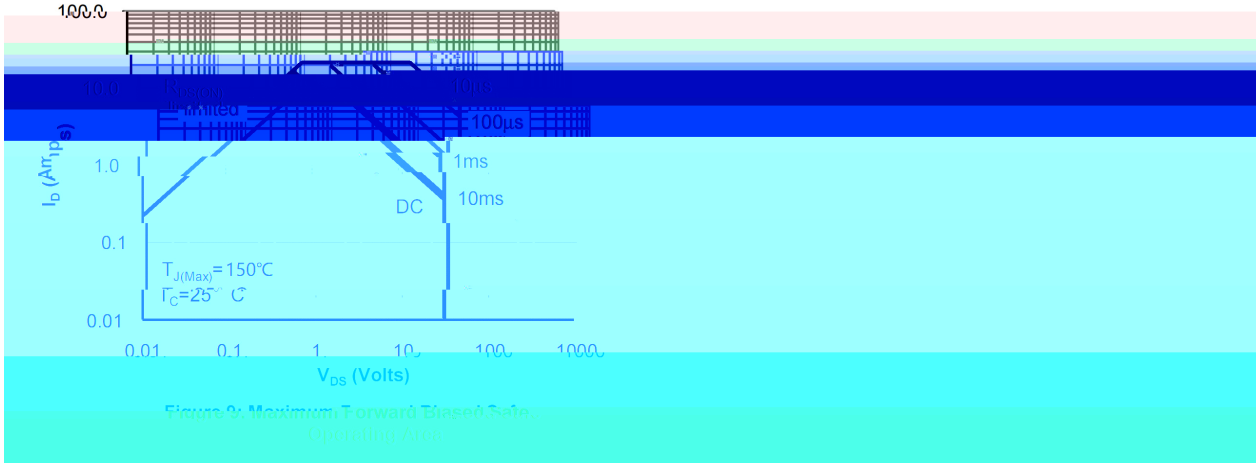
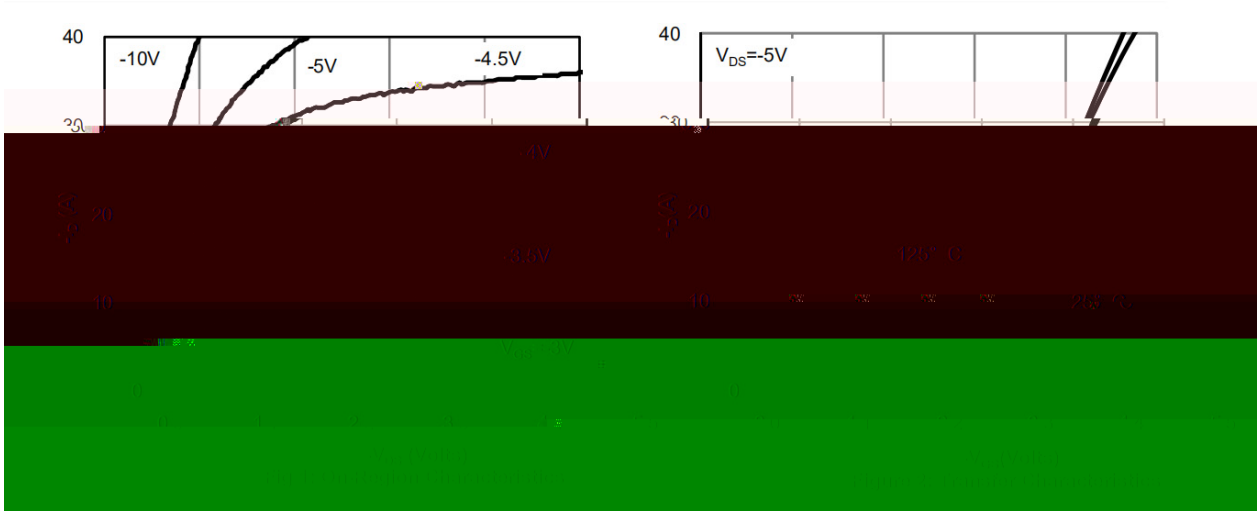



Figure 9: Maximum Forward Biased Safe Operating Area

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=-250 A | -30 | -34 | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-30V $V_{GS}$=0V | | | -1.0 | A |
| | | $V_{DS}$=-30V $V_{GS}$=0V $T_J$=55℃ | | | -5.0 | A |
| Gate-Body leakage current | $I_{GSS}$ | $V_{GS}$=±20V $V_{DS}$=0V | | | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$ $I_D$=-250 A | -1.0 | -1.85 | -2.5 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=-10V $I_D$=-6.0A | | 52 | 60 | m |
| | | $V_{GS}$=-4.5V $I_D$=-5.0A | | 73 | 85 | m |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V $I_S$=-1.0A | | -0.81 | -1.2 | V |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-25V $V_{GS}$=0V f=1.0MHz | | 900 | | pF |
| Output Capacitance | $C_{oss}$ | | | 235 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 195 | | pF |
| Gate resistance | $R_g$ | $V_{DS}$=0V $V_{GS}$=0V f=1.0MHz | | 26 | | |
| Total Gate Charge(10V) | $Q_g$ | $V_{GS}$=-10V $V_{DS}$=-15V $I_D$=-6.5A | | 13.6 | | nC |
| Total Gate Charge(4.5V) | | | | 6.7 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 2.5 | | nC |
| Gate-Drain Charge | $Q_{gd}$ | | | 3.2 | | nC |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}$=-15 V $V_{GS}$=-10V $R_L$=2.3 $R_{GEN}$=3 | | | | |

## P– / P-CHANNEL Electrical Characteristic Curve



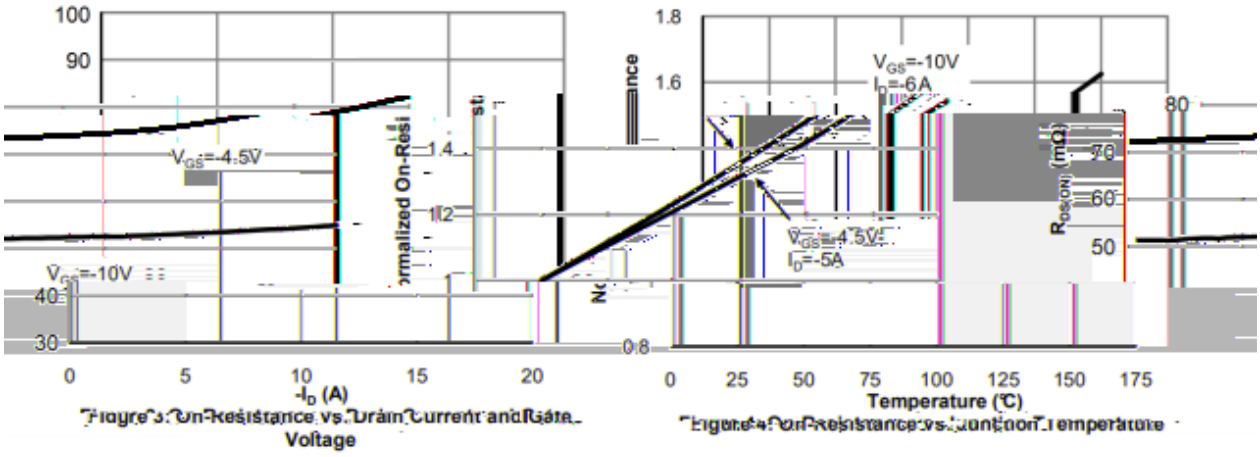
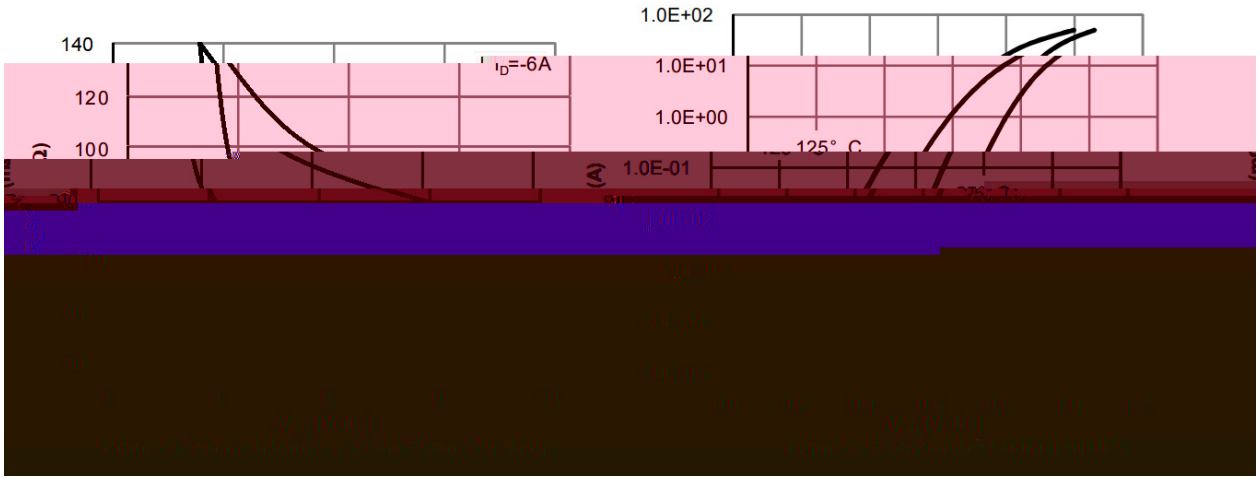
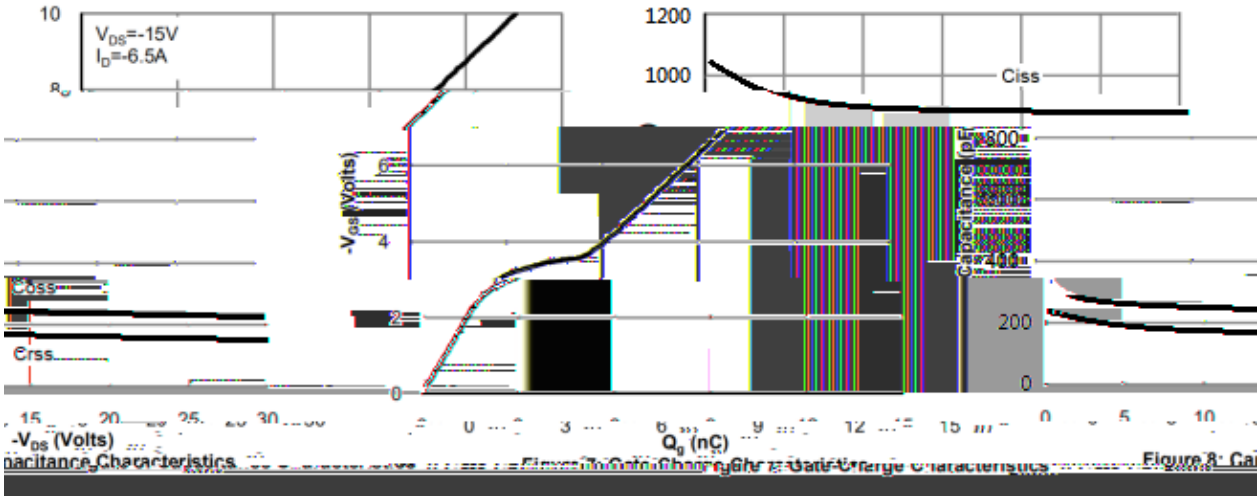



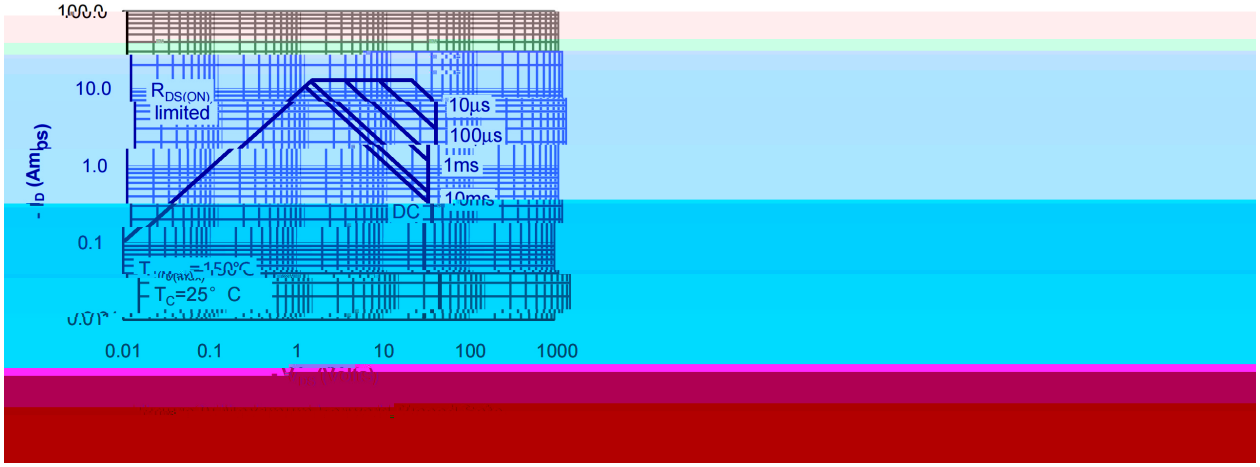

Figure 3: On-Resistance vs. Drain Current and Gate Voltage

Figure 4: On-Resistance vs. Junction Temperature



## P– / P-CHANNEL Electrical Characteristic Curve

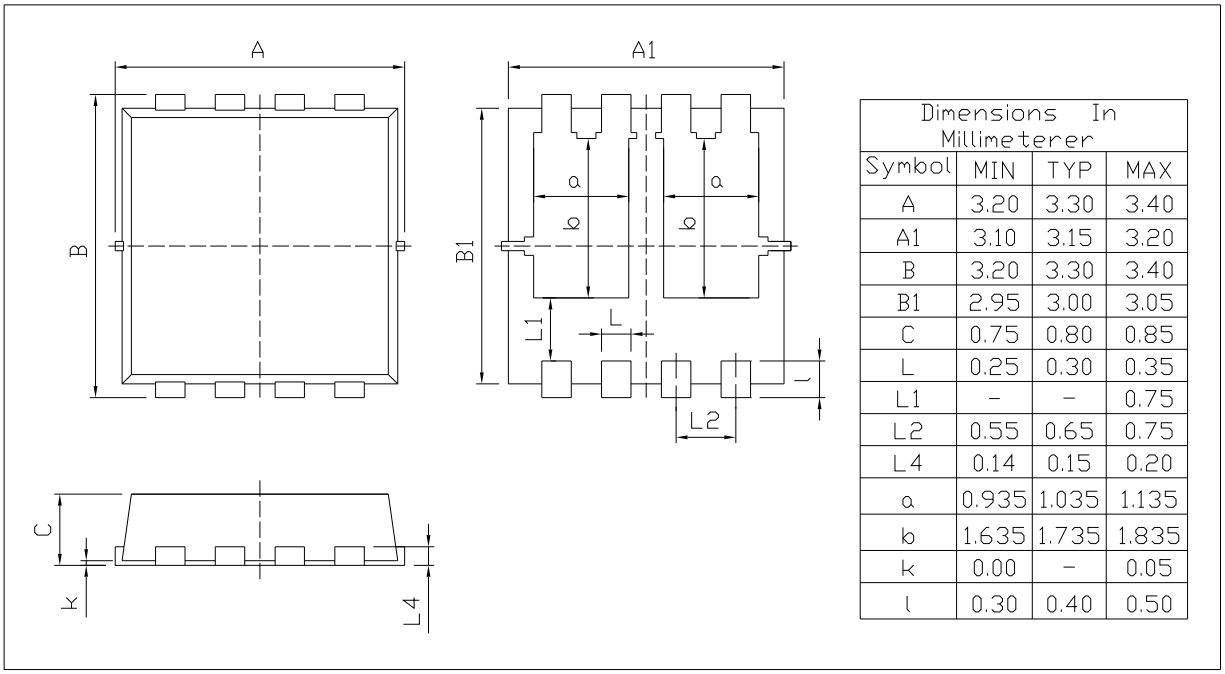


## / Package Dimensions

PDFN3X3-8L

Unit:mm




| Dimensions In Millimeterer | | | |
|---|---|---|---|
| Symbol | MIN | TYP | MAX |
| A | 3.20 | 3.30 | 3.40 |
| A1 | 3.10 | 3.15 | 3.20 |
| B | 3.20 | 3.30 | 3.40 |
| B1 | 2.95 | 3.00 | 3.05 |
| C | 0.75 | 0.80 | 0.85 |
| L | 0.25 | 0.30 | 0.35 |
| L1 | - | - | 0.75 |
| L2 | 0.55 | 0.65 | 0.75 |
| L4 | 0.14 | 0.15 | 0.20 |
| a | 0.935 | 1.035 | 1.135 |
| b | 1.635 | 1.735 | 1.835 |
| k | 0.00 | - | 0.05 |
| l | 0.30 | 0.40 | 0.50 |

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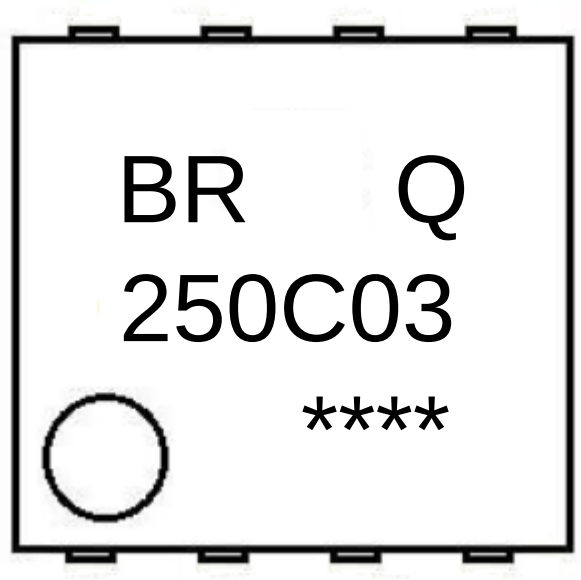
## / Marking Instructions




BR

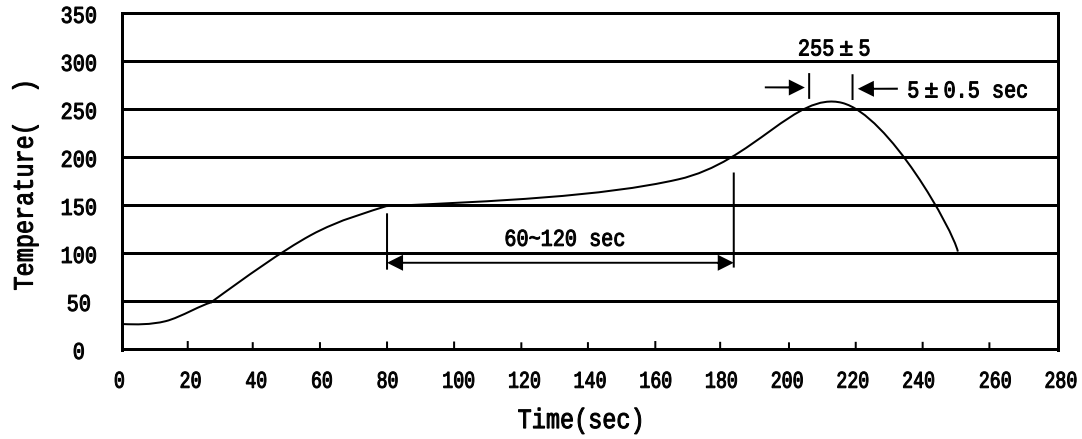
Q

250C03

Note:

| | |
|---|---|
| BR: | Company Code |
| Q: | Automobile halogen-free product Code |
| 250C03: | Product Type Code |
| ****: | Lot No. Code, code change with Lot No |

## ( ) / Temperature Profile for IR Reflow Soldering(Pb-Free)




Note:

| | | |
|---|---|---|
| 1 | 150 200 60 120sec; | 1.Preheating:150~200 , Time:60~120sec. |
| 2 | 255 5 5 0.5sec; | 2.Peak Temp.:255 5 , Duration:5 0.5sec. |
| 3 | 2 10 /sec. | 3. Cooling Speed: 2~10 /sec. |

## / Resistance to Soldering Heat Test Conditions

260 5 10 1 sec. Temp.:260±5 Time:10±1 sec

## / Packaging SPEC.

/ REEL

| Package Type | Units | | | | | Dimension | | (unit mm³) |
|---|---|---|---|---|---|---|---|---|
| | Units/Reel / | Reels/Inner Box / | Units/Inner Box / | Inner Boxes/Outer Box / | Units/Outer Box / | Reel | Inner Box | Outer Box |
| PDFN3×3-8L | 5,000 | 2 | 10,000 | 6 | 60,000 | 13″ ×12 | 360×360×50 | 380×335×366 |

## / Notices