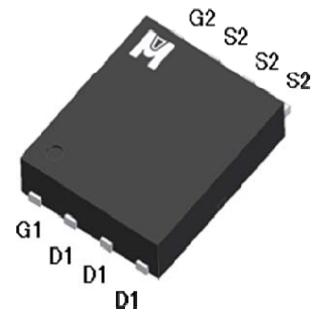
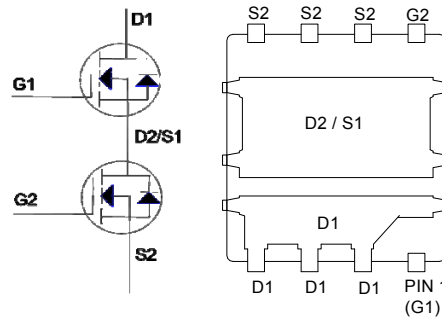




N-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

| | N-CH-Q1 | N-CH-Q2 |
|----------------------------|---------|---------|
| BV _{DSS} | 30V | 30V |
| R _{DS(on)} (MAX.) | 9.5mΩ | 9.5mΩ |
| I _D | 15A | 15A |



UIS, R_g 100% Tested

Pb-Free Lead Plating & Halogen Free



ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C Unless Otherwise Noted)

| PARAMETERS/TEST CONDITIONS | | SYMBOL | LIMITS | | UNIT |
|--|--------------------------------|-----------------------------------|------------|-------|------|
| | | | Q1 | Q2 | |
| Gate-Source Voltage | | V _{GS} | ±20 | ±20 | V |
| Continuous Drain Current | T _C = 25 °C | I _D | 15 | 15 | A |
| | T _C = 100 °C | | 12 | 12 | |
| Pulsed Drain Current ¹ | | I _{DM} | 60 | 60 | |
| Avalanche Current | | I _{AS} | 15 | 15 | |
| Avalanche Energy | L = 0.1mH, R _G =25Ω | E _{AS} | 11.25 | 11.25 | mJ |
| Repetitive Avalanche Energy ² | L = 0.05mH | E _{AR} | 5.62 | 5.62 | |
| Power Dissipation | T _C = 25 °C | P _D | 48 | 69 | W |
| | T _C = 100 °C | | 25 | 36 | |
| Operating Junction & Storage Temperature Range | | T _j , T _{stg} | -55 to 150 | | °C |

THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE | SYMBOL | | TYPICAL | MAXIMUM | | UNIT |
|---------------------|------------------|--------------|---------|---------|-----|--------|
| | R _{θJC} | Steady State | | | | |
| Junction-to-Case | R _{θJC} | Steady State | | 2.6 | 1.8 | °C / W |
| Junction-to-Ambient | R _{θJA} | Steady State | | 62 | 60 | |
| | R _{θJA} | t ≤ 10 s | | 27 | 25 | |

¹Pulse width limited by maximum junction temperature.

²Duty cycle ≤ 1%

R_{θJA} when mounted on a 1 in² pad of 2 oz copper.



ELECTRICAL CHARACTERISTICS ($T_c = 25\text{ }^\circ\text{C}$, Unless Otherwise Noted)

| PARAMETER | SYMBOL | TEST CONDITIONS | LIMITS | | | UNIT | | |
|---|--------------------|--|---------------------------|-----|------|-----------|------------|----|
| | | | MIN | TYP | MAX | | | |
| STATIC | | | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$ | Q1 | 30 | | V | | |
| | | | Q2 | 30 | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | Q1 | 1 | 1.5 | 3 | | |
| | | | Q2 | 1 | 1.5 | 3 | | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0V, V_{GS} = \pm 20V$ | Q1 | | | ± 100 | nA | |
| | | | Q2 | | | ± 100 | | |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 24V, V_{GS} = 0V$ | Q1 | | | 1 | μA | |
| | | | Q2 | | | 1 | | |
| | | $V_{DS} = 20V, V_{GS} = 0V, T_J = 125\text{ }^\circ\text{C}$ | Q1 | | | 25 | | |
| | | | Q2 | | | 25 | | |
| On-State Drain Current ¹ | $I_{D(ON)}$ | $V_{DS} = 10V, V_{GS} = 10V$ | Q1 | 15 | | A | | |
| | | | Q2 | 15 | | | | |
| Drain-Source On-State Resistance ¹ | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 13A$ | Q1 | | 8.2 | 9.5 | m Ω | |
| | | | Q2 | | 8.2 | 9.5 | | |
| | | | $V_{GS} = 4.5V, I_D = 9A$ | Q1 | | 11 | | 15 |
| | | | | Q2 | | 11 | | 15 |
| Forward Transconductance ¹ | g_{fs} | $V_{DS} = 5V, I_D = 13A$ | Q1 | | 18 | S | | |
| | | | Q2 | | 18 | | | |
| DYNAMIC | | | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0V, V_{DS} = 15V, f = 1MHz$ | Q1 | | 828 | pF | | |
| | | | Q2 | | 828 | | | |
| Output Capacitance | C_{oss} | | Q1 | | 196 | | | |
| | | | Q2 | | 196 | | | |
| Reverse Transfer Capacitance | C_{rss} | | Q1 | | 174 | | | |
| | | | Q2 | | 174 | | | |
| Gate Resistance | R_g | $V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz$ | Q1 | | 1.7 | Ω | | |
| | | | Q2 | | 1.7 | | | |
| Total Gate Charge ^{1,2} | $Q_g(V_{GS}=10V)$ | $V_{DD} = 15V, V_{GS} = 10V,$ $I_D = 10A$ | Q1 | | 17.6 | nC | | |
| | | | Q2 | | 17.6 | | | |
| | $Q_g(V_{GS}=4.5V)$ | | Q1 | | 12.5 | | | |
| | | | Q2 | | 12.5 | | | |



| | | | | | | | |
|---|--------------|---|--------------------------|----|-----|-----|---|
| Gate-Source Charge ^{1,2} | Q_{gs} | $V_{DD} = 15V, V_{GS} = 10V,$ $I_D = 10A$ | Q1 | | 2.8 | | |
| | | | Q2 | | 2.8 | | |
| Gate-Drain Charge ^{1,2} | Q_{gd} | | Q1 | | 7.4 | | |
| | | | Q2 | | 7.4 | | |
| Turn-On Delay Time ^{1,2} | $t_{d(on)}$ | $V_{DD} = 15V,$ $I_D = 1A, V_{GS} = 10V, R_{GS} = 2.7\Omega$ | Q1 | | 8 | nS | |
| | | | Q2 | | 8 | | |
| Rise Time ^{1,2} | t_r | | Q1 | | 18 | | |
| | | | Q2 | | 18 | | |
| Turn-Off Delay Time ^{1,2} | $t_{d(off)}$ | | Q1 | | 20 | | |
| | | | Q2 | | 20 | | |
| Fall Time ^{1,2} | t_f | Q1 | | 12 | | | |
| | | Q2 | | 12 | | | |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_c = 25^\circ C$) | | | | | | | |
| Continuous Current | I_S | | Q1 | | 15 | A | |
| | | | Q2 | | 15 | | |
| Pulsed Current ³ | I_{SM} | | Q1 | | 60 | | |
| | | | Q2 | | 60 | | |
| Forward Voltage ¹ | V_{SD} | | $I_F = 10A, V_{GS} = 0V$ | Q1 | | 1.3 | V |
| | | | $I_F = 10A, V_{GS} = 0V$ | Q2 | | 1.3 | |
| Reverse Recovery Time | t_{rr} | Q1 | Q1 | | 22 | nS | |
| | | $I_F = 10A, di_F/dt = 100A / \mu S$ | Q2 | | 22 | | |
| Reverse Recovery Charge | Q_{rr} | Q2 | Q1 | | 6 | nC | |
| | | $I_F = 10A, di_F/dt = 100A / \mu S$ | Q2 | | 6 | | |

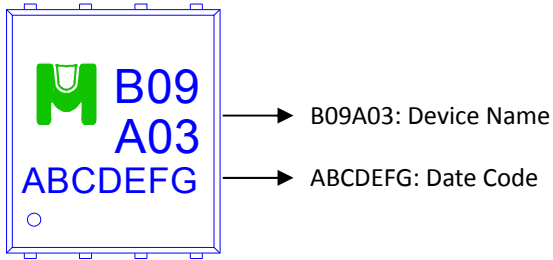
¹Pulse test : Pulse Width $\leq 300 \mu sec$, Duty Cycle $\leq 2\%$.

²Independent of operating temperature.

³Pulse width limited by maximum junction temperature.

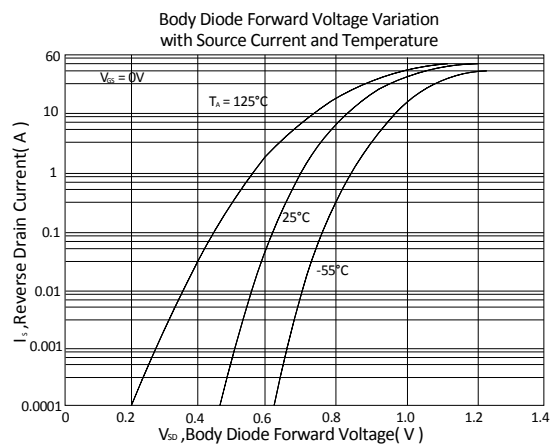
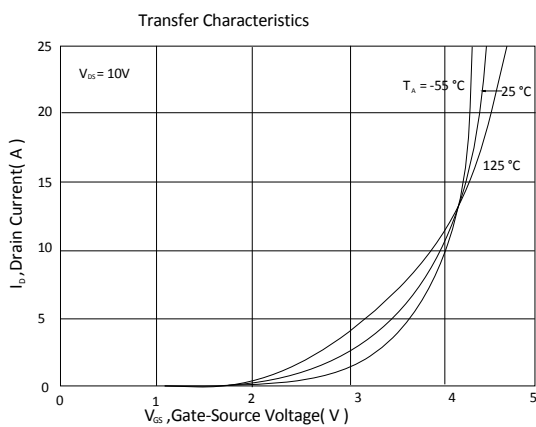
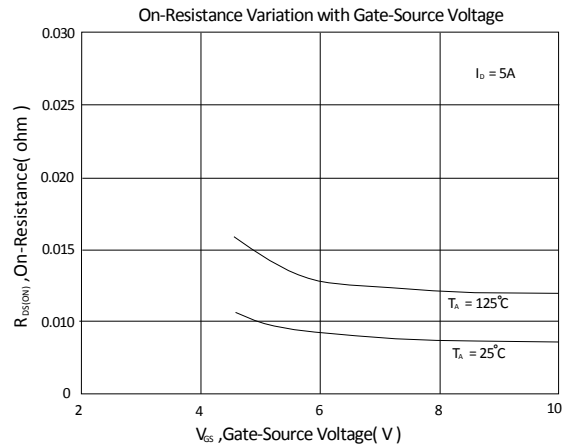
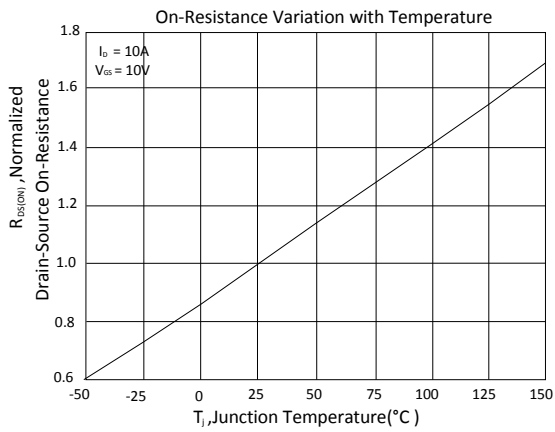
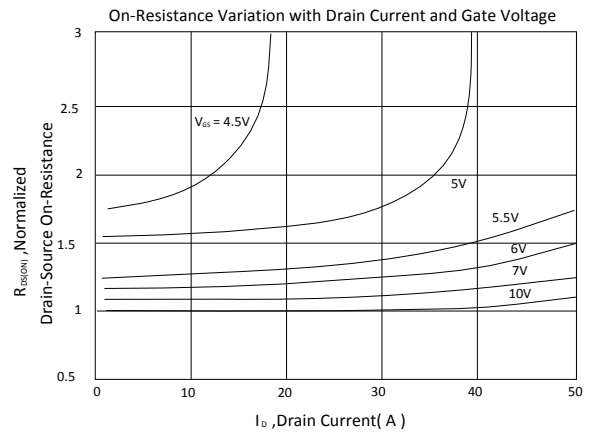
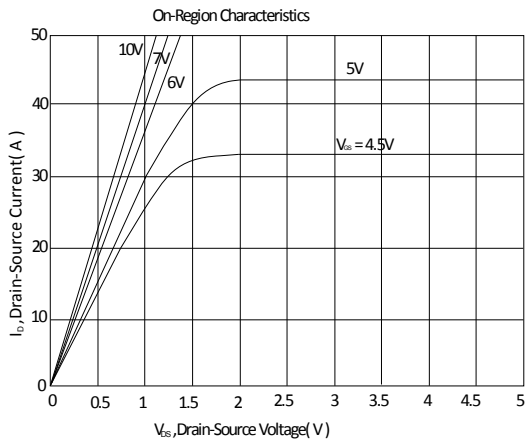
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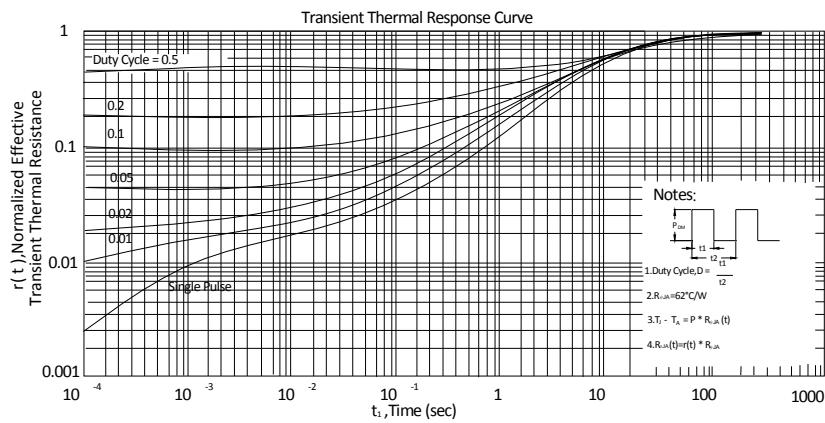
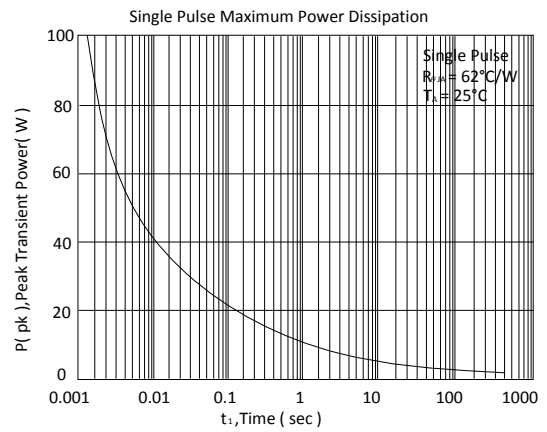
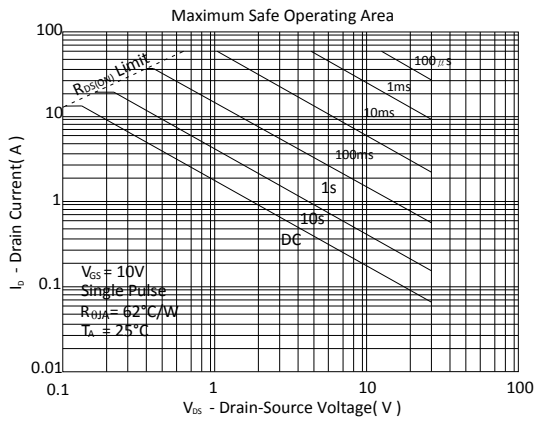
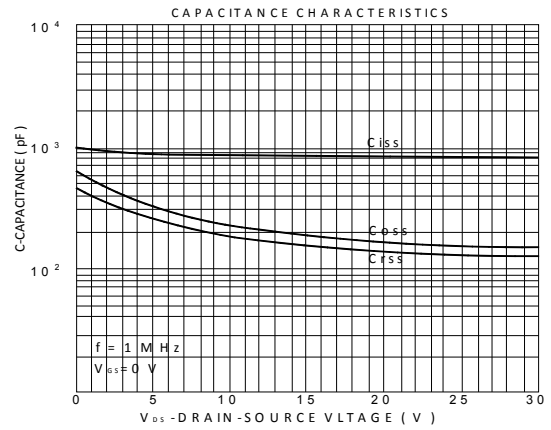
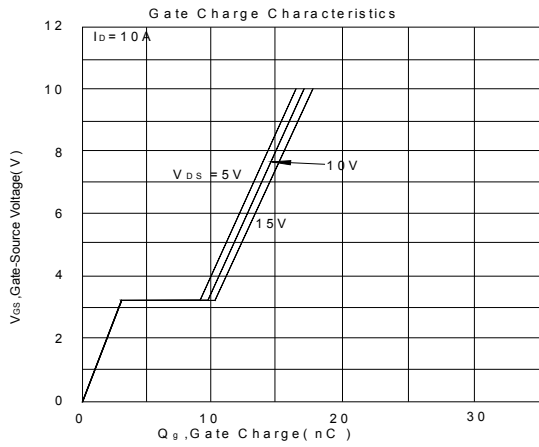
Device Name: EMB09A03HP for Asymmetric Dual EDFN 5 x 6





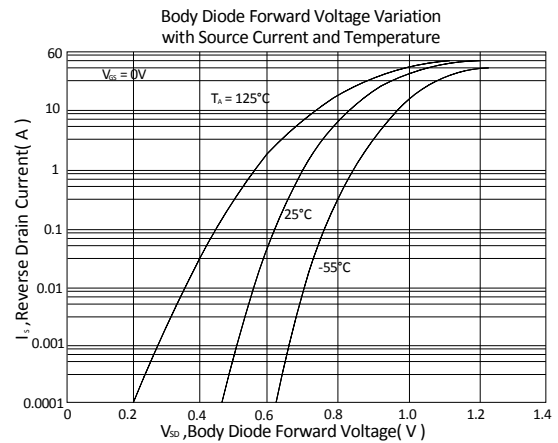
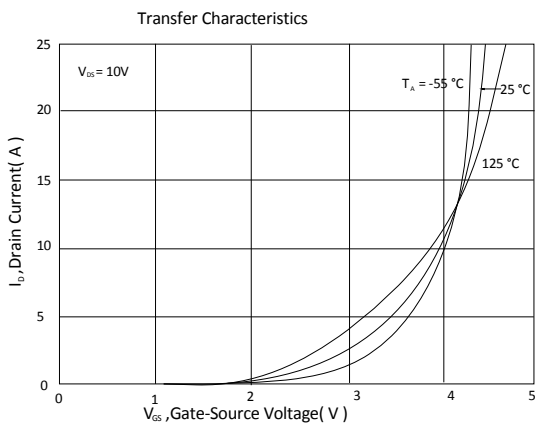
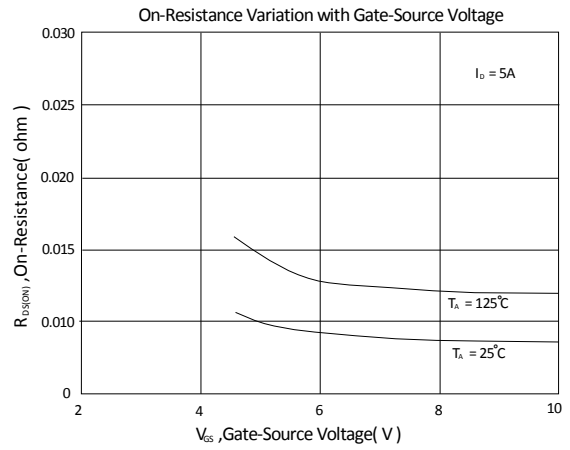
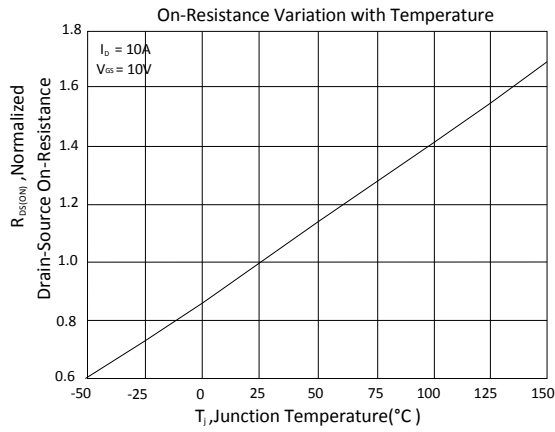
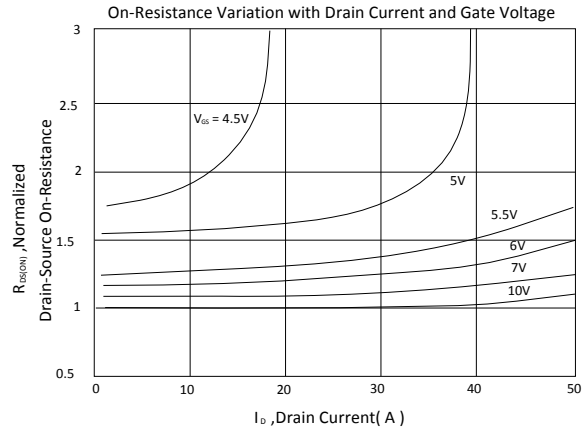
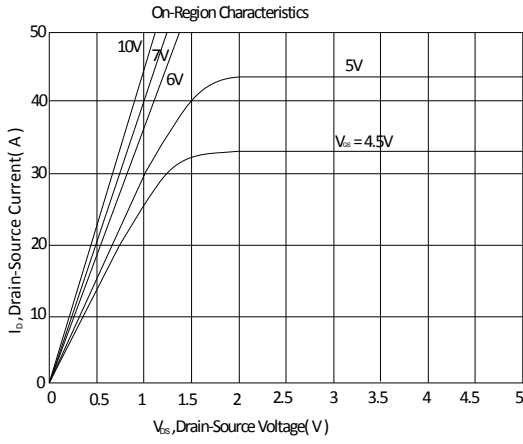
Q1 TYPICAL CHARACTERISTICS

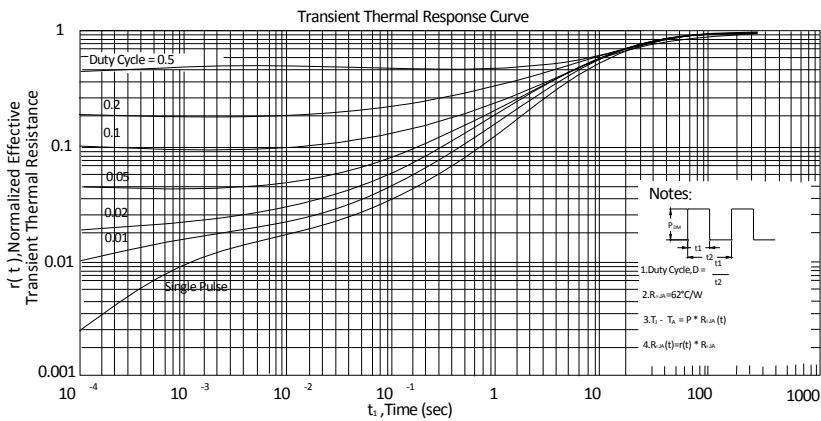
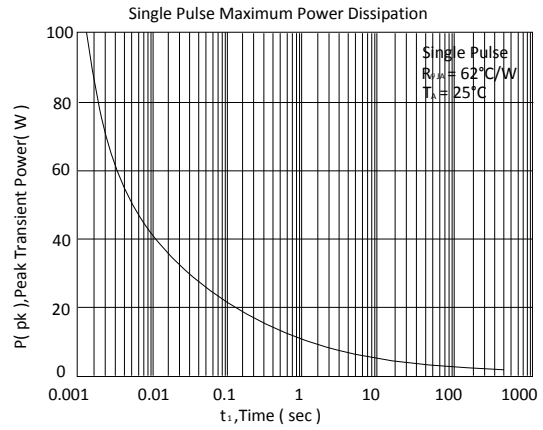
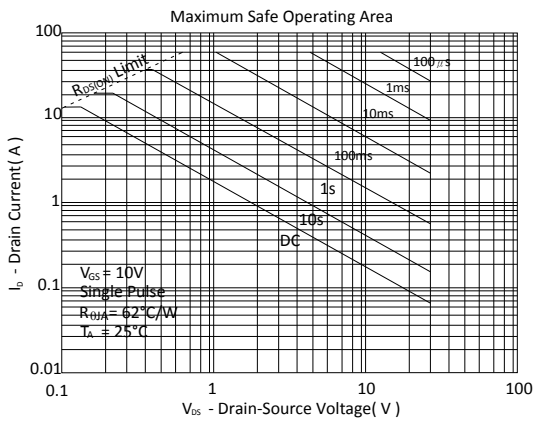
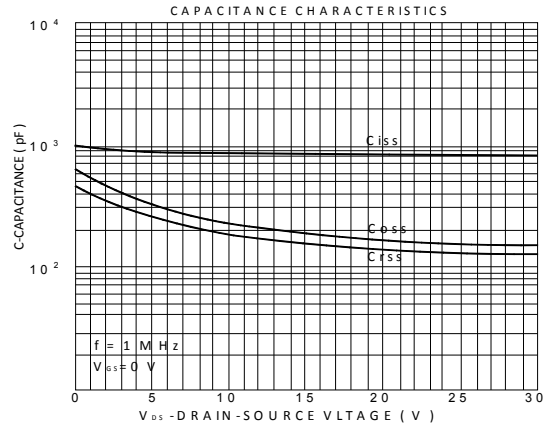
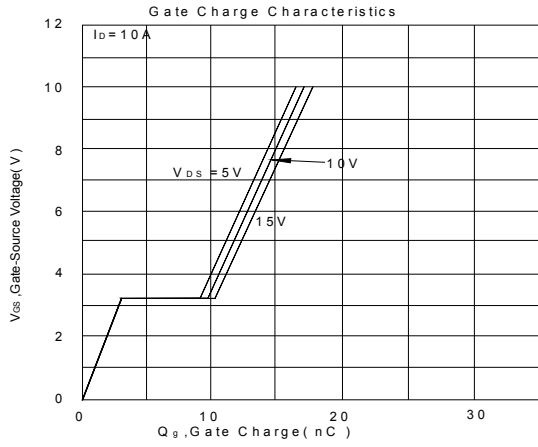






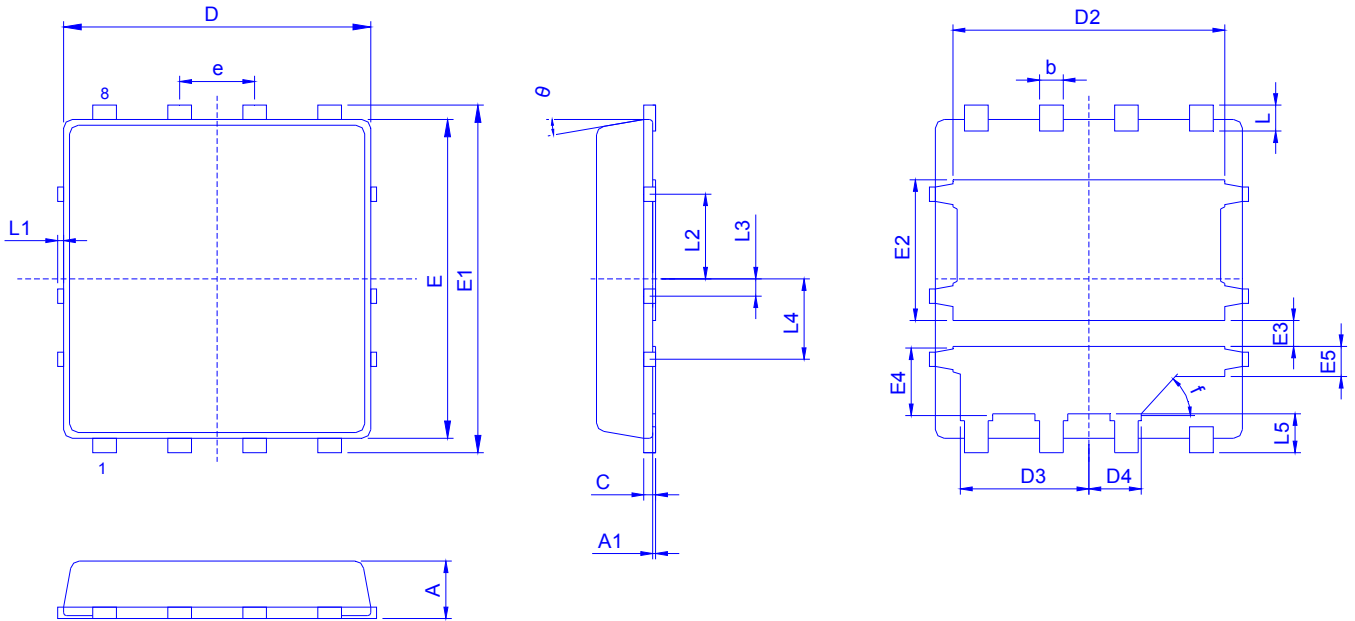
Q2 TYPICAL CHARACTERISTICS







Outline Drawing



Dimension in mm

| Dimension | A | A1 | b | c | D | D2 | D3 | D4 | E | E1 | E2 | E3 | E4 | E5 |
|-----------|------|------|------|------|-----|-----|-------|-------|------|------|------|------|-------|-------|
| Min. | 0.85 | 0.00 | 0.35 | 0.15 | | 4.5 | 2.125 | 0.835 | | | 2.4 | 0.40 | 1.125 | 0.475 |
| Typ. | 0.90 | | 0.40 | 0.20 | 5.2 | 4.6 | 2.175 | 0.885 | 5.55 | 6.05 | 2.45 | 0.45 | 1.175 | 0.525 |
| Max. | 1.00 | 0.05 | 0.45 | 0.25 | | 4.7 | 2.225 | 0.935 | | | 2.5 | 0.50 | 1.225 | 0.575 |

| Dimension | e | L | L1 | L2 | L3 | L4 | L5 | F | θ |
|-----------|------|------|-----|-------|-----|-----|-------|-----|-----|
| Min. | | 0.35 | 0 | 1.375 | 0.2 | 1.3 | 0.575 | | 0° |
| Typ. | 1.27 | 0.45 | | 1.475 | 0.3 | 1.4 | 0.675 | 45° | |
| Max. | | 0.55 | 0.1 | 1.575 | 0.4 | 1.5 | 0.775 | | 10° |

Recommended minimum pads

