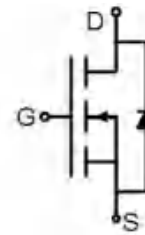


AP2045Q

N-Channel Enhancement Mosfet

Feature

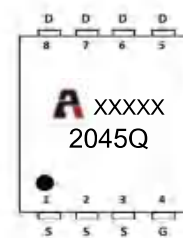
- 20V,60A
 $R_{DS(ON)} < 5.2m\Omega @ V_{GS}=4.5V$ TYP=4.3 m Ω
 $R_{DS(ON)} < 7.8m\Omega @ V_{GS}=2.5V$ TYP=7.8 m Ω
- Advanced Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge



Schematic Diagram

Application

- PWM applications
- Load Switch
- Power management



Marking and pin Assignment

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|---------|----------------|-----------|------------|----------------|
| 2045Q | AP2045Q | PDFN3X3-8L | 13 inch | - | 5000 |

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|-----------------|-----------|---------------------------|
| Drain-Source Voltage | V_{DS} | 20 | V |
| Gate-Source Voltage | V_{GS} | ± 12 | V |
| Continuous Drain Current ($T_a=25^\circ\text{C}$) | I_D | 60 | A |
| Continuous Drain Current ($T_a=100^\circ\text{C}$) | I_D | 40 | A |
| Pulsed Drain Current ⁽¹⁾ | I_{DM} | 200 | A |
| Singel Pulsed Avalanche Energy ⁽²⁾ | E_{AS} | 60 | mJ |
| Power Dissipation | P_D | 30 | W |
| Thermal Resistance from Junction to Case ⁽⁴⁾ | $R_{\theta JC}$ | 3.2 | $^\circ\text{C}/\text{W}$ |
| Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -55~ +150 | $^\circ\text{C}$ |

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

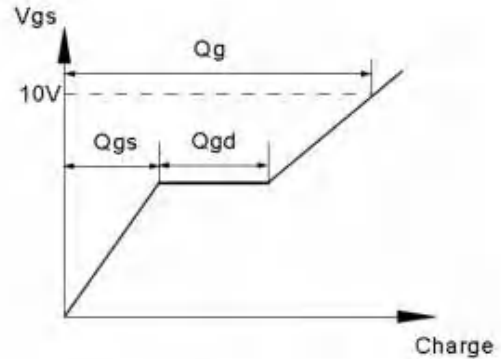
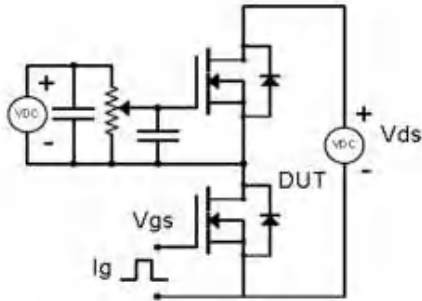
| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---------------|--|-----|------|-----------|------------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$ | 20 | - | - | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = 20V, V_{GS} = 0V$ | - | - | 1 | μA |
| Gate-body leakage current | I_{GSS} | $V_{GS} = \pm 12V, V_{DS} = 0V$ | - | - | ± 100 | nA |
| Gate threshold voltage ⁽³⁾ | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 0.5 | 0.7 | 0.9 | V |
| Drain-source on-resistance ⁽³⁾ | $R_{DS(on)}$ | $V_{GS} = 4.5V, I_D = 30A$ | - | 4.3 | 5.2 | m Ω |
| | | $V_{GS} = 2.5V, I_D = 20A$ | - | 5.8 | 7.8 | |
| Dynamic characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$ | - | 1832 | - | pF |
| Output Capacitance | C_{oss} | | - | 289 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 271 | - | |
| Switching characteristics | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 10V, I_D = 25A,$ $V_{GS} = 4.5V, R_G = 1.8\Omega$ | - | 15 | - | ns |
| Turn-on rise time | t_r | | - | 37 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 52 | - | |
| Turn-off fall time | t_f | | - | 21 | - | |
| Total Gate Charge | Q_g | $V_{DS} = 10V, I_D = 25A,$ $V_{GS} = 4.5V$ | - | 23 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 4.5 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 7.3 | - | |
| Source-Drain Diode characteristics | | | | | | |
| Diode Forward voltage ⁽³⁾ | V_{DS} | $V_{GS} = 0V, I_S = 25A$ | - | - | 1.2 | V |
| Diode Forward current ⁽⁴⁾ | I_S | | - | - | 60 | A |

Notes:

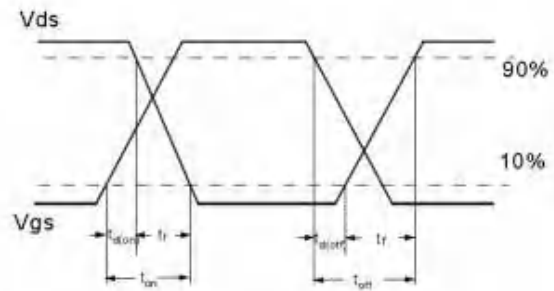
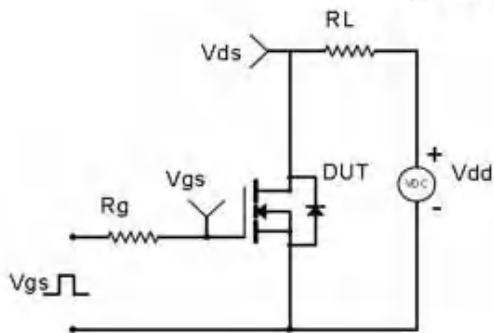
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: $T_J = 25^{\circ}\text{C}, V_{DD} = 15V, R_G = 25\Omega, L = 0.5\text{mH}$
3. Pulse Test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
4. Surface Mounted on FR4 Board, $t \leq 10\text{ sec}$

Test Circuit & Waveform

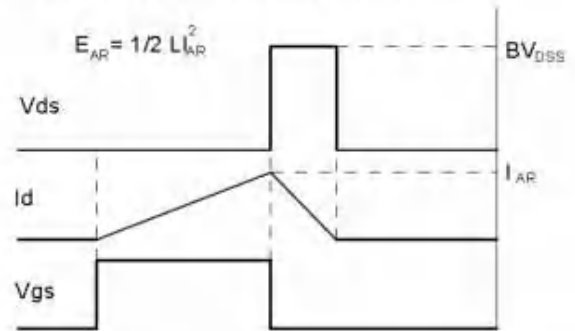
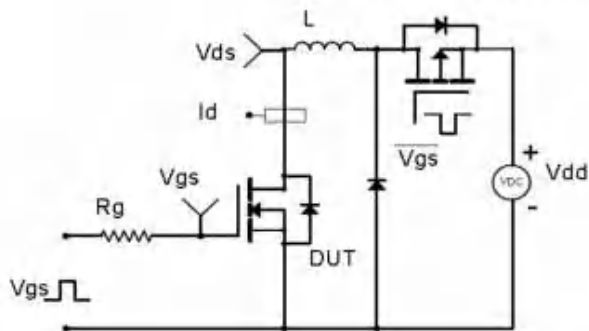
Gate Charge Test Circuit & Waveform



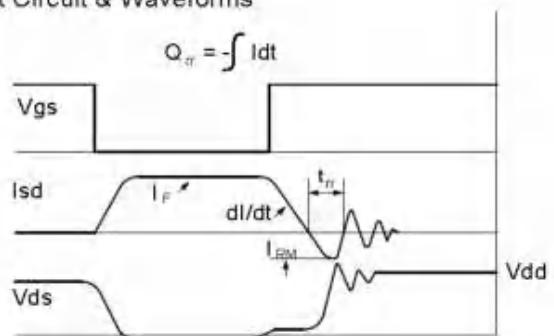
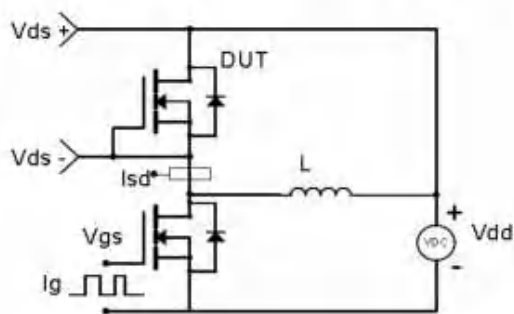
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Performance Characteristics

Figure 1: Output Characteristics

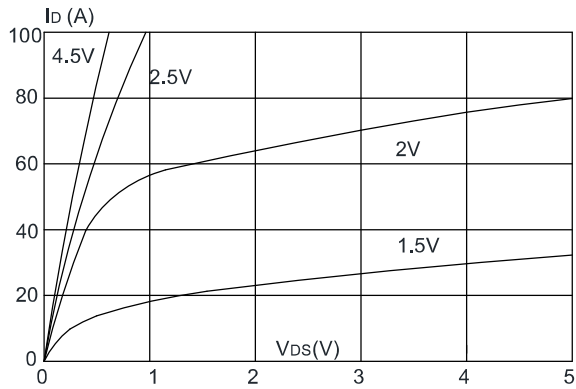


Figure 2: Typical Transfer Characteristics

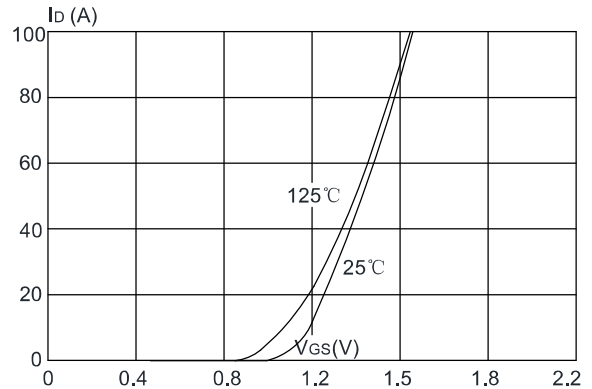


Figure 3: On-resistance vs. Drain Current

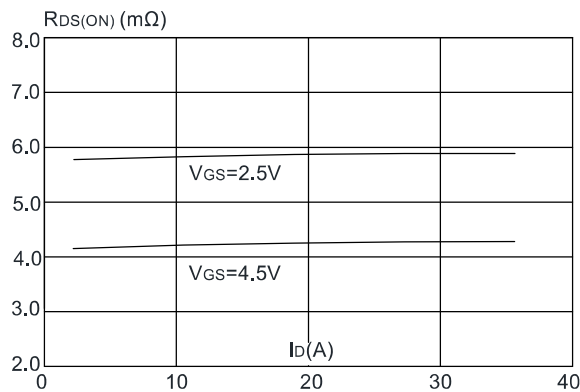


Figure 4: Body Diode Characteristics

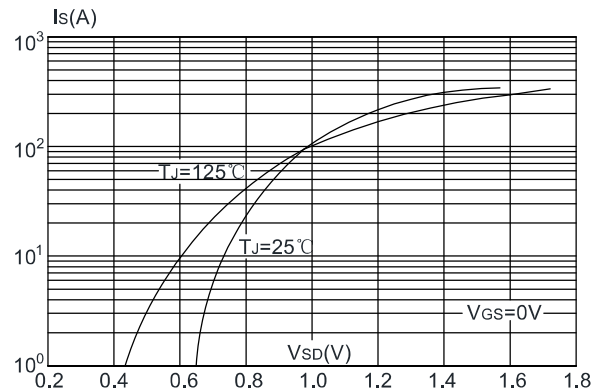


Figure 5: Gate Charge Characteristics

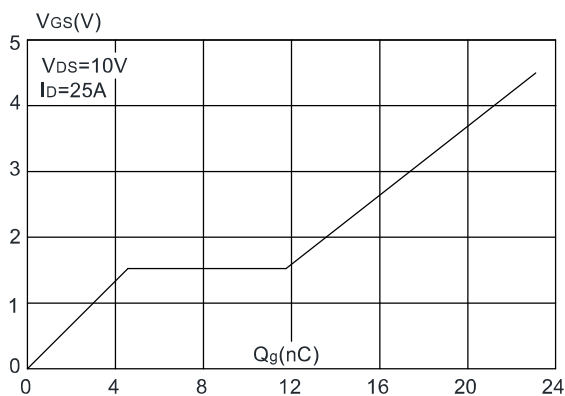


Figure 6: Capacitance Characteristics

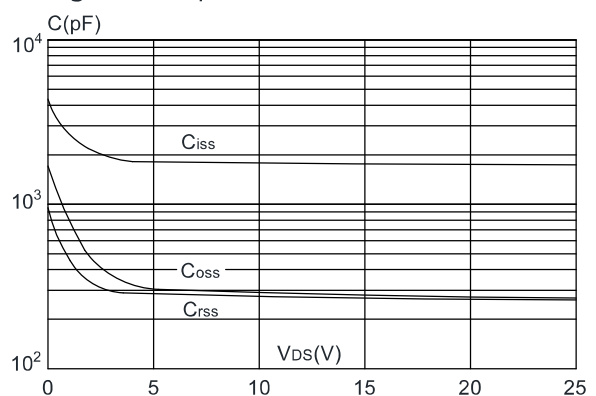


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

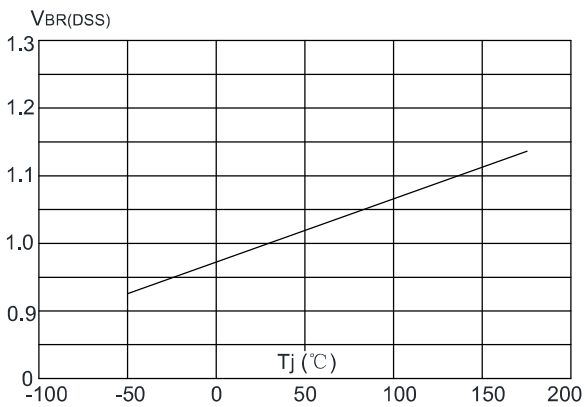


Figure 8: Normalized on Resistance vs. Junction Temperature

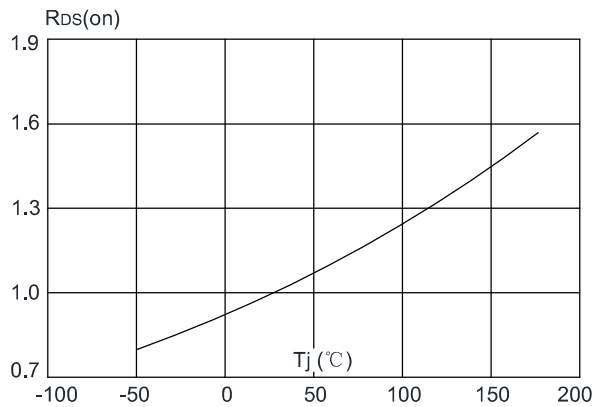


Figure 9: Maximum Safe Operating Area

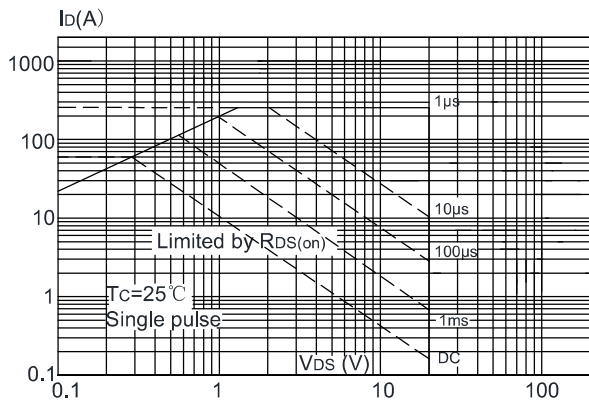


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

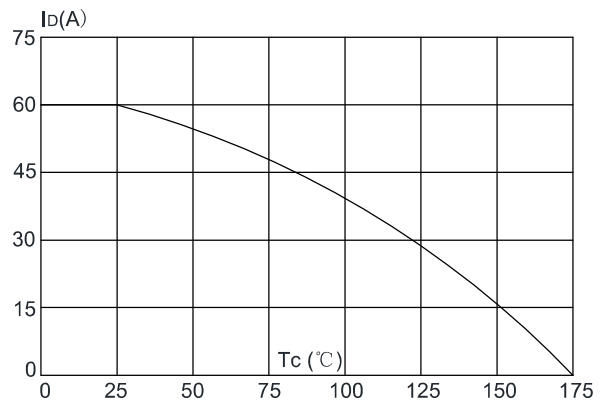
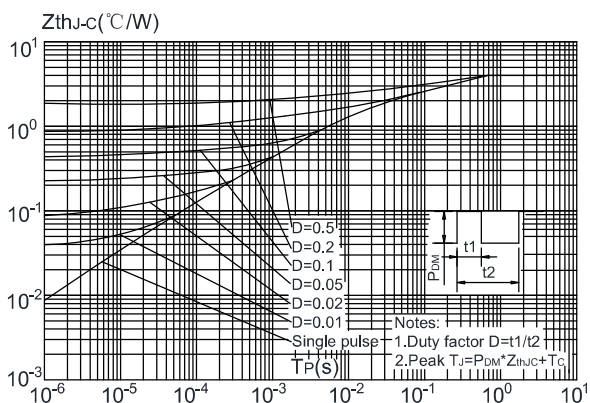


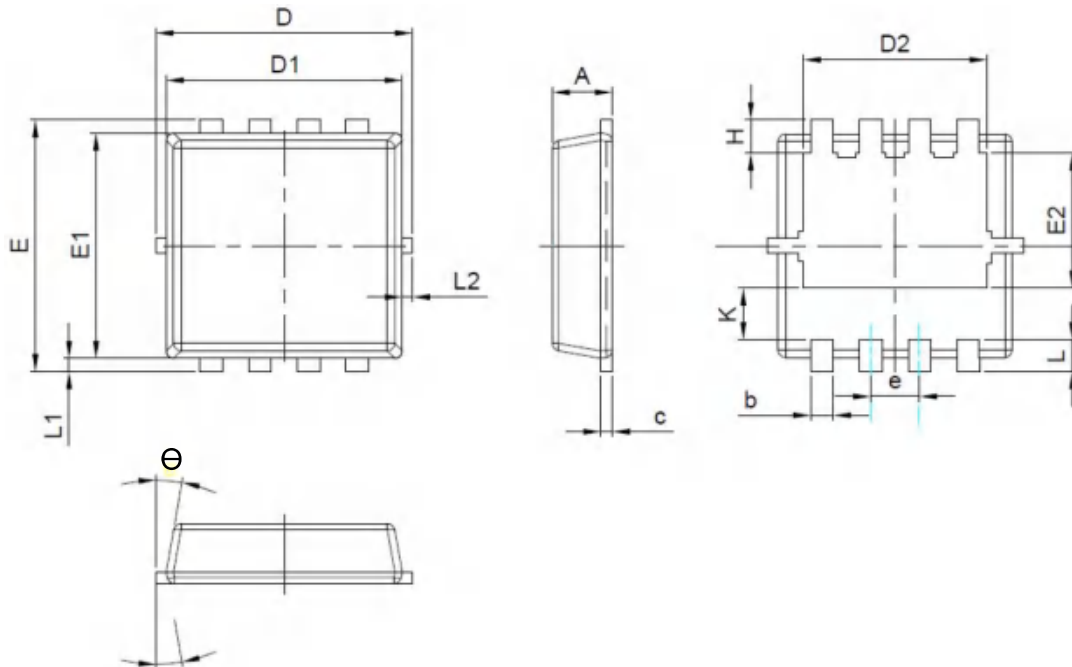
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



AP2045Q

N-Channel Enhancement Mosfet

PDFN3X3-8L Package Information



COMMON DIMENSIONS (UNITS OF MEASURE = MILLIMETER)

| SYMBOL | MIN | NOM | MAX |
|----------|----------|-------|-------|
| A | 0.70 | 0.80 | 0.90 |
| b | 0.25 | 0.30 | 0.39 |
| c | 0.14 | 0.15 | 0.25 |
| D | 3.20 | 3.30 | 3.40 |
| D1 | 3.00 | 3.15 | 3.30 |
| D2 | 2.35 | 2.45 | 2.55 |
| e | 0.65 BSC | | |
| E | 3.25 | 3.35 | 3.45 |
| E1 | 2.85 | 3.00 | 3.15 |
| E2 | 1.635 | 1.735 | 1.835 |
| H | 0.33 | 0.48 | 0.63 |
| K | 0.585 | 0.685 | 0.785 |
| L | 0.30 | 0.40 | 0.50 |
| L1 | 0.05 | 0.15 | 0.25 |
| L2 | - | - | 0.15 |
| θ | 8° | 10° | 12° |