



N-channel Enhancement-mode Power MOSFET

Preliminary

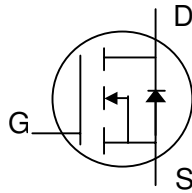
Simple Drive Requirement

Industry Standard Compatible "5x6"

Package with Heatsink

Low On-resistance

RoHS-compliant, halogen-free

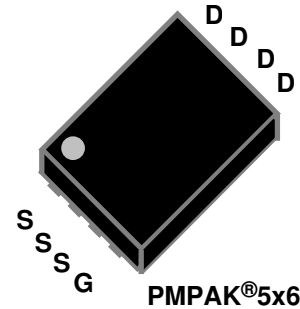


| | |
|--------------|----------------|
| BV_{DS} | 30V |
| $R_{DS(ON)}$ | 0.99m Ω |
| I_D | 260A |

Description

Advanced Power MOSFETs from APEC provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The PMPAK[®]5x6 package is specially designed for DC-DC converter applications, with a foot print that is compatible with other popular "5x6" packages and offers a backside heat sink and low package profile.



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---------------------------------|--|------------|------------------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D at $T_C=25^\circ\text{C}$ | Continuous Drain Current (Chip) ⁴ | 260 | A |
| I_D at $T_A=25^\circ\text{C}$ | Continuous Drain Current ³ | 57 | A |
| I_D at $T_A=70^\circ\text{C}$ | Continuous Drain Current ³ | 46 | A |
| I_{DM} | Pulsed Drain Current ¹ | 300 | A |
| P_D at $T_C=25^\circ\text{C}$ | Total Power Dissipation | 104 | W |
| P_D at $T_A=25^\circ\text{C}$ | Total Power Dissipation | 5 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Data

| Symbol | Parameter | Value | Units |
|--------|---|-------|---------------------------|
| Rthj-c | Maximum Thermal Resistance, Junction-case | 1.2 | $^\circ\text{C}/\text{W}$ |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient ³ | 25 | $^\circ\text{C}/\text{W}$ |

Ordering Information

AP1A003GMT-HF-3TR : in RoHS-compliant halogen-free PMPAK[®]5x6, shipped on tape and reel (3000pcs/reel)

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Electrical Specifications at $T_j=25^\circ\text{C}$ (unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units | |
|--------------|--|-------------------------------|-------------------|------|-----------|------------|----|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 30 | - | - | V | |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=10V, I_D=25A$ | - | - | 0.99 | m Ω | |
| | | $V_{GS}=5V, I_D=25A$ | - | - | 2 | m Ω | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1 | - | 3 | V | |
| g_{fs} | Forward Transconductance | $V_{DS}=10V, I_D=25A$ | - | 75 | - | S | |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=24V, V_{GS}=0V$ | - | - | 10 | μA | |
| I_{GSS} | Gate-Source Leakage | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA | |
| Q_g | Total Gate Charge | $I_D=25A$ $V_{DS}=15V$ | - | 70 | 112 | nC | |
| Q_{gs} | Gate-Source Charge | | $V_{GS}=4.5V$ | - | 30 | - | nC |
| Q_{gd} | Gate-Drain ("Miller") Charge | | $V_{GS}=10V$ | - | 30 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time | $R_G=3.3\Omega$ | - | 25 | - | ns | |
| t_r | Rise Time | | $I_D=1A$ | - | 15 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | $V_{GS}=10V$ | - | 100 | - | ns | |
| t_f | Fall Time | | $V_{GS}=10V$ | - | 60 | - | ns |
| C_{iss} | Input Capacitance | $V_{GS}=0V$ $V_{DS}=15V$ | - | 9800 | 15680 | pF | |
| C_{oss} | Output Capacitance | | $f=1.0\text{MHz}$ | - | 1070 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | $f=1.0\text{MHz}$ | - | 710 | - | pF |
| R_g | Gate Resistance | $f=1.0\text{MHz}$ | - | 1.1 | 2.2 | Ω | |

Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|----------|---------------------------------|---|--------------------|------|------|-------|
| V_{SD} | Forward On Voltage ² | $I_S=20A, V_{GS}=0V$ | - | - | 1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_S=10A, V_{GS}=0V,$ $di/dt=100A/\mu s$ | - | 40 | - | ns |
| Q_{rr} | Reverse Recovery Charge | | $di/dt=100A/\mu s$ | - | 35 | - |

Notes:

1. Pulse width limited by maximum junction temperature
2. Pulse test
3. Surface mounted on 1 in² copper pad of FR4 board, $t \leq 10\text{sec}$, 60°C/W at steady state.
4. Package limitation current is 60A.

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

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Typical Electrical Characteristics

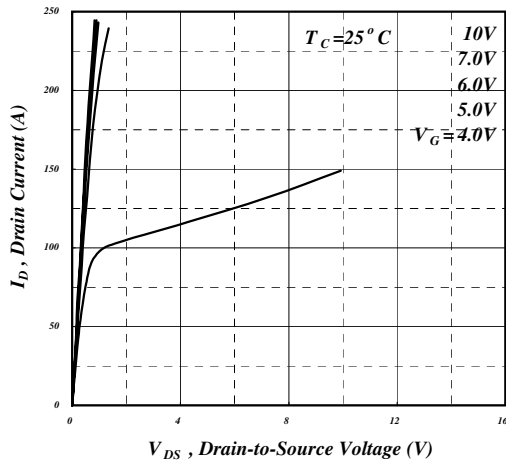


Fig 1. Typical Output Characteristics

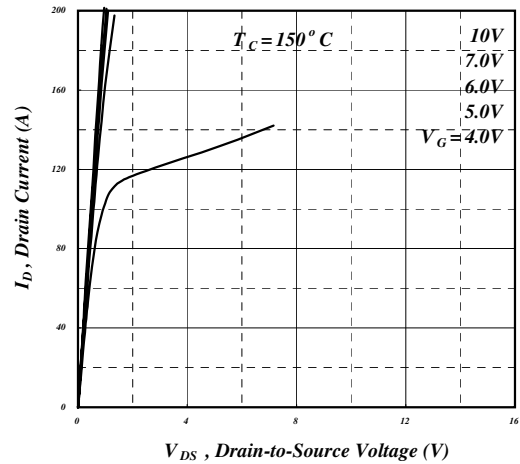


Fig 2. Typical Output Characteristics

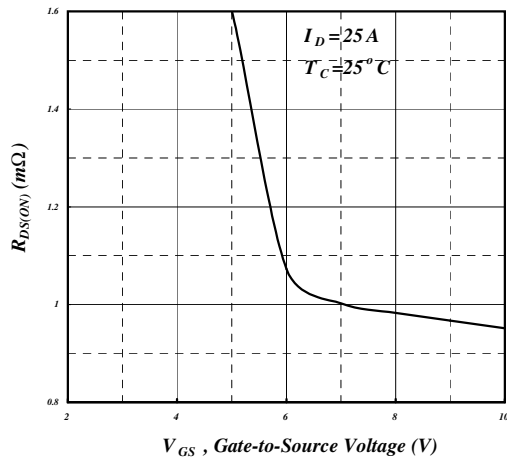


Fig 3. On-Resistance vs. Gate Voltage

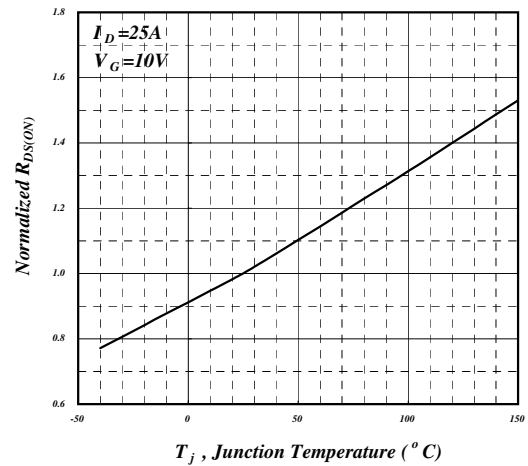


Fig 4. Normalized On-Resistance vs. Junction Temperature

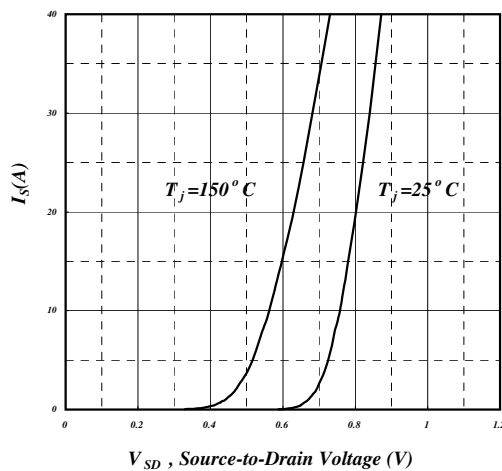


Fig 5. Forward Characteristic of Reverse Diode

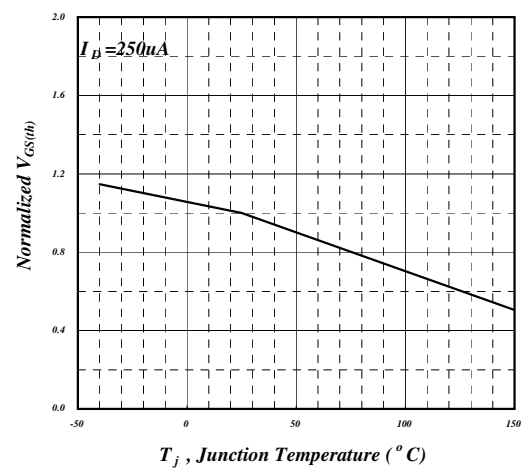


Fig 6. Gate Threshold Voltage vs. Junction Temperature



Typical Electrical Characteristics (cont.)

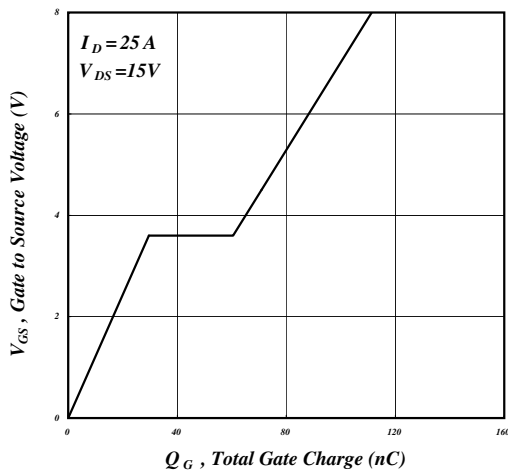


Fig 7. Gate Charge Characteristics

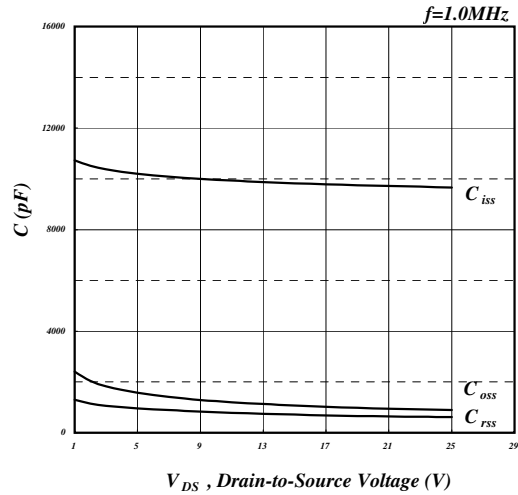


Fig 8. Typical Capacitance Characteristics

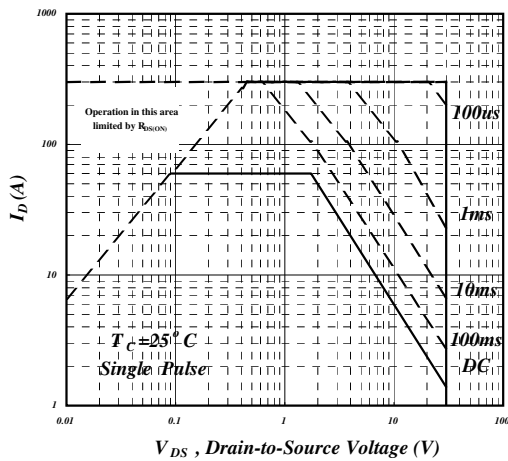


Fig 9. Maximum Safe Operating Area

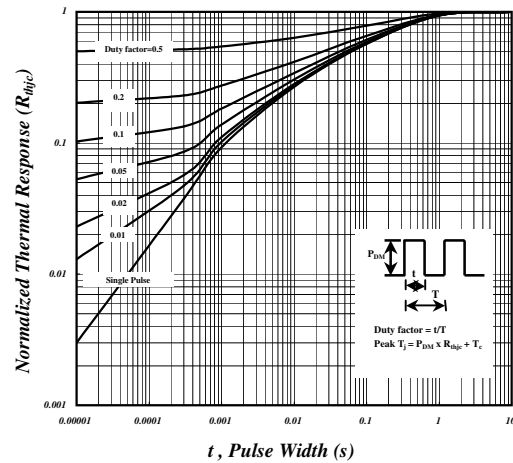


Fig 10. Effective Transient Thermal Impedance

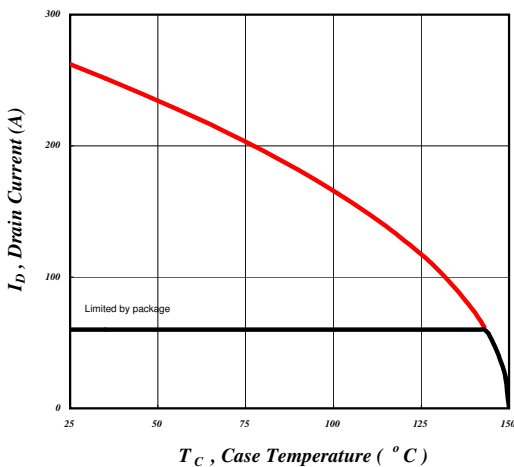


Fig 11. Maximum Continuous Drain Current v.s. Case Temperature

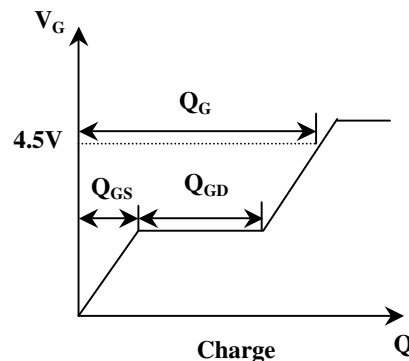
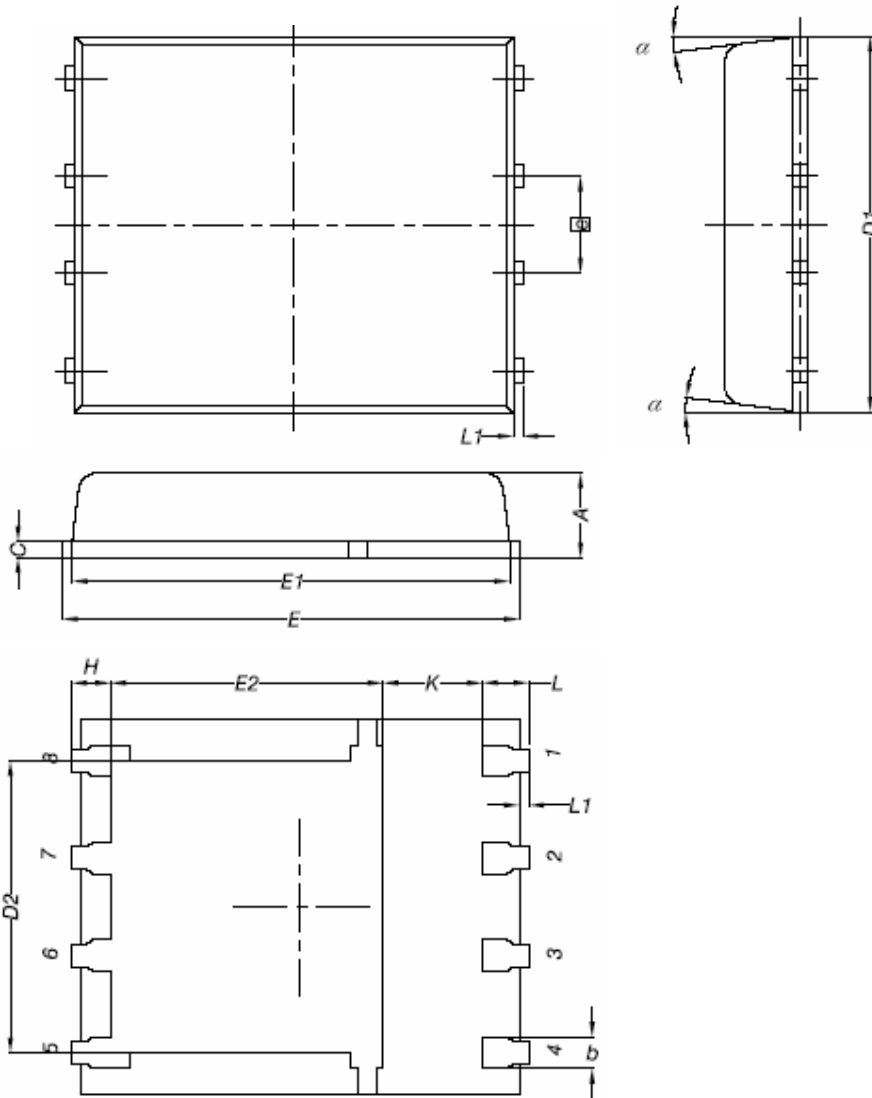


Fig 12. Gate Charge Waveform



Package Dimensions: PMPAK[®]5x6

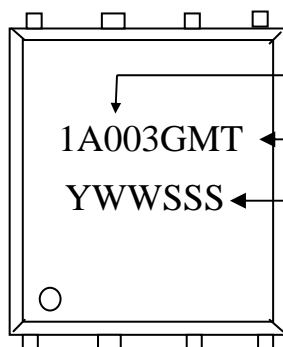


BACKSIDE VIEW

| SYMBOLS | Millimeters | | |
|----------------------|-------------|------|------|
| | MIN | NOM | MAX |
| A | 0.90 | 1.00 | 1.10 |
| b | 0.33 | 0.41 | 0.51 |
| C | 0.20 | - | - |
| D1 | 4.80 | 4.90 | 5.10 |
| D2 | - | - | 4.20 |
| E | 5.90 | 6.00 | 6.10 |
| E1 (Reference) | 5.70 | 5.75 | 5.80 |
| E2 (Reference) | 3.38 | 3.58 | 3.78 |
| e | 1.27 BSC | | |
| H | - | - | 0.62 |
| K (Reference) | 0.70 | - | - |
| L | 0.51 | 0.61 | 0.71 |
| L1 | - | - | 0.20 |
| α (Reference) | 0° | - | 12° |

1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

Marking Information:



Product: AP1A003
 Package code
 GMT = RoHS-compliant halogen-free PMPAK[®]5x6
 Date Code (YWWSSS)
 Y: Last Digit Of The Year
 WW: Work week
 SSS: Lot code sequence