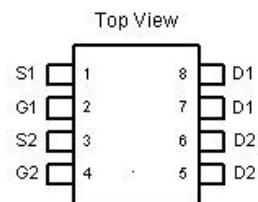


Dual P-Channel Enhancement Mode MOSFET

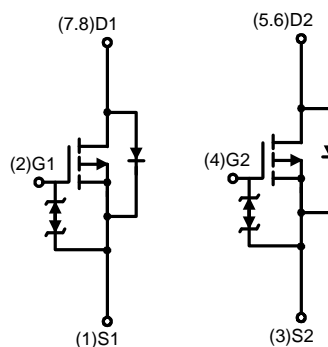
Features

- 20V/-2.5A
- $R_{DS(ON)} = 88m\Omega(\text{typ.}) @ V_{GS} = -4.5V$
- $R_{DS(ON)} = 120m\Omega(\text{typ.}) @ V_{GS} = -2.5V$
- $R_{DS(ON)} = 160m\Omega(\text{typ.}) @ V_{GS} = -1.8V$
- Super High Dense Cell Design
- Reliable and Rugged

Pin Description



P Channel MOSFET



P Channel MOSFET

Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

Ordering and Marking Information

| | |
|---|--|
| <p>APM2103 □□-□□□</p> <p style="margin-left: 20px;"> └─ Lead Free Code └─ Handling Code └─ Temp. Range └─ Package Code </p> | <p>Package Code SG : JSC70-8</p> <p>Operating Junction Temp. Range C : -55 to 150 °C</p> <p>Handling Code TR : Tape & Reel</p> <p>Lead Free Code L : Lead Free Device Blank : Original Device</p> |
| <p>APM2103 : M2103</p> | <p>XXXXX - Date Code</p> |

Note: ANPEC lead-free products contain molding compounds/die attach materials and 100% matte tin plate termination finish; which are fully compliant with RoHS and compatible with both SnPb and lead-free soldering operations. ANPEC lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J STD-020C for MSL classification at lead-free peak reflow temperature.

ANPEC reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Rating | Unit | |
|-------------------|--|---------------------------|--------------------|-----|
| V_{DSS} | Drain-Source Voltage | -20 | V | |
| V_{GSS} | Gate-Source Voltage | ± 12 | | |
| I_D^* | Continuous Drain Current | -2.5 | A | |
| I_{DM}^* | 300 μs Pulsed Drain Current | | | -10 |
| I_S^* | Diode Continuous Forward Current | -1.3 | A | |
| T_J | Maximum Junction Temperature | 150 | $^\circ\text{C}$ | |
| T_{STG} | Storage Temperature Range | -55 to 150 | | |
| P_D^* | Maximum Power Dissipation | $T_A = 25^\circ\text{C}$ | 1.14 | W |
| | | $T_A = 100^\circ\text{C}$ | 0.45 | |
| $R_{\theta JA}^*$ | Thermal Resistance-Junction to Ambient | 110 | $^\circ\text{C/W}$ | |

Notes: *Surface Mounted on 1in² pad area, $t \leq 5\text{sec}$.

Electrical Characteristics ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

| Symbol | Parameter | Test Condition | APM2103SG | | | Unit |
|--|----------------------------------|--|-----------|------|----------|------------|
| | | | Min. | Typ. | Max. | |
| Static Characteristics | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_{DS}=250\mu A$ | -20 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=-16V, V_{GS}=0V$ $T_J=85^\circ\text{C}$ | | | -1 | μA |
| | | | | | -30 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_{DS}=-250\mu A$ | -0.5 | -0.7 | -1 | V |
| I_{GSS} | Gate Leakage Current | $V_{GS}=\pm 10V, V_{DS}=0V$ | | | ± 10 | μA |
| $R_{DS(ON)}^a$ | Drain-Source On-State Resistance | $V_{GS}=-4.5V, I_{DS}=-2.5A$ | | 88 | 110 | m Ω |
| | | $V_{GS}=-2.5V, I_{DS}=-2A$ | | 120 | 160 | |
| | | $V_{GS}=-1.8V, I_{DS}=-1A$ | | 160 | 260 | |
| V_{SD}^a | Diode Forward Voltage | $I_{SD}=-1.3A, V_{GS}=0V$ | | -0.8 | -1.3 | V |
| Gate Charge Characteristics^b | | | | | | |
| Q_g | Total Gate Charge | $V_{DS}=-10V, V_{GS}=-4.5V,$ $I_{DS}=-2.5A$ | | 5.8 | 8 | nC |
| Q_{gs} | Gate-Source Charge | | | 1.3 | | |
| Q_{gd} | Gate-Drain Charge | | | 1.1 | | |

Electrical Characteristics (Cont.) (T_A = 25°C unless otherwise noted)

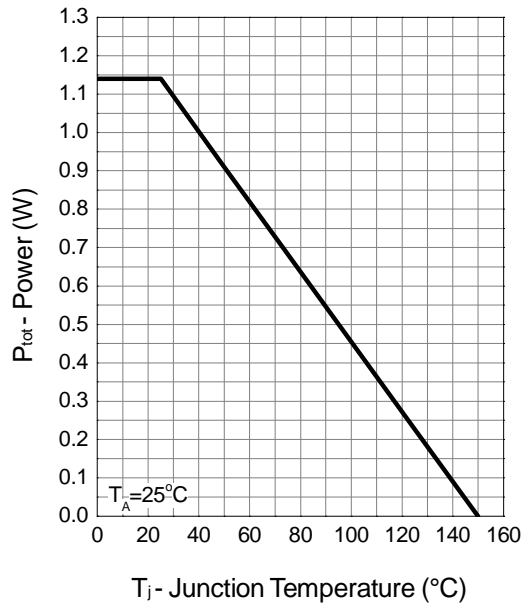
| Symbol | Parameter | Test Condition | APM2103SG | | | Unit |
|--|------------------------------|--|-----------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Dynamic Characteristics^b | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =-10V, Frequency=1.0MHz | | 360 | | pF |
| C _{oss} | Output Capacitance | | | 80 | | |
| C _{rss} | Reverse Transfer Capacitance | | | 50 | | |
| t _{d(ON)} | Turn-on Delay Time | V _{DD} =-10V, R _L =10Ω, I _{DS} =1A, V _{GEN} =-4.5V, R _G =6Ω | | 8 | 15 | ns |
| t _r | Turn-on Rise Time | | | 22 | 41 | |
| t _{d(OFF)} | Turn-off Delay Time | | | 29 | 53 | |
| t _f | Turn-off Fall Time | | | 32 | 59 | |
| t _{rr} | Reverse Recovery Time | I _{SD} =-2.5A dI _{SD} /dt =100A/μs | | 14 | | ns |
| Q _{rr} | Reverse Recovery Charge | | | 6 | | nc |

Notes:

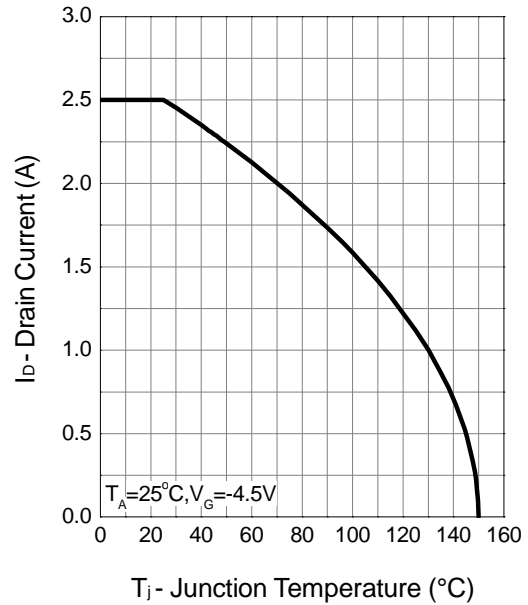
- a : Pulse test ; pulse width≤300μs, duty cycle≤2%.
- b : Guaranteed by design, not subject to production testing.

Typical Characteristics

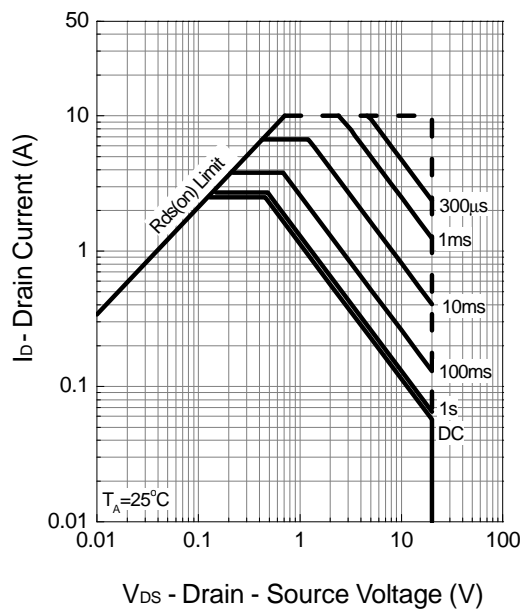
Power Dissipation



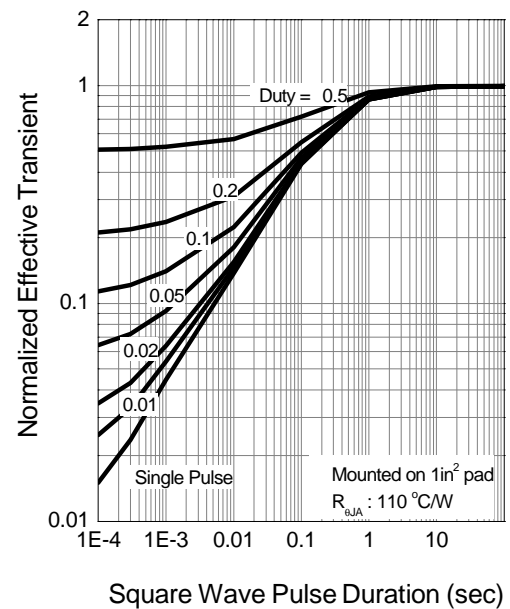
Drain Current



Safe Operation Area

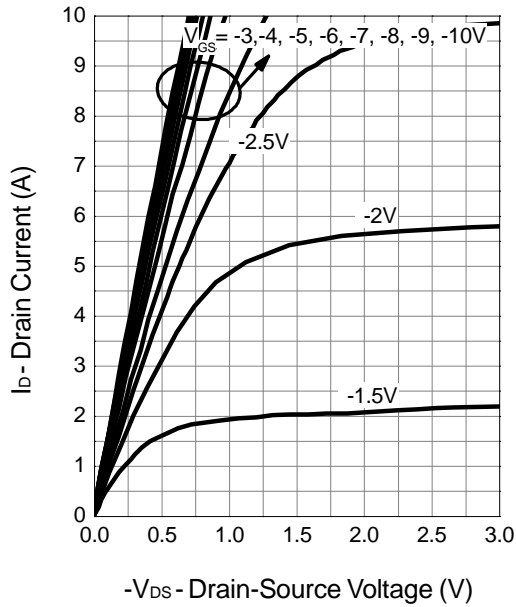


Thermal Transient Impedance

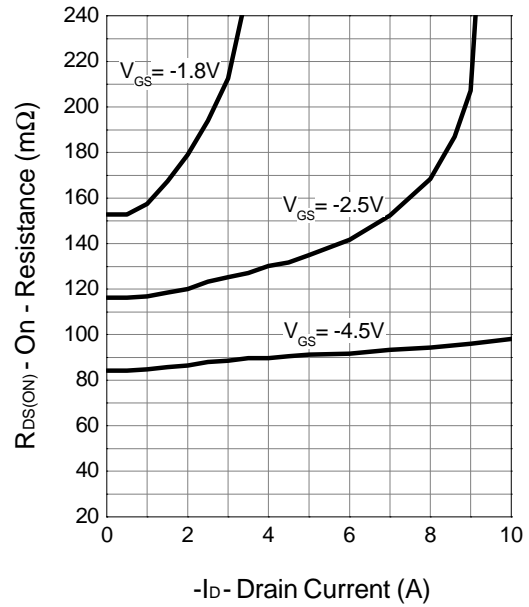


Typical Characteristics (Cont.)

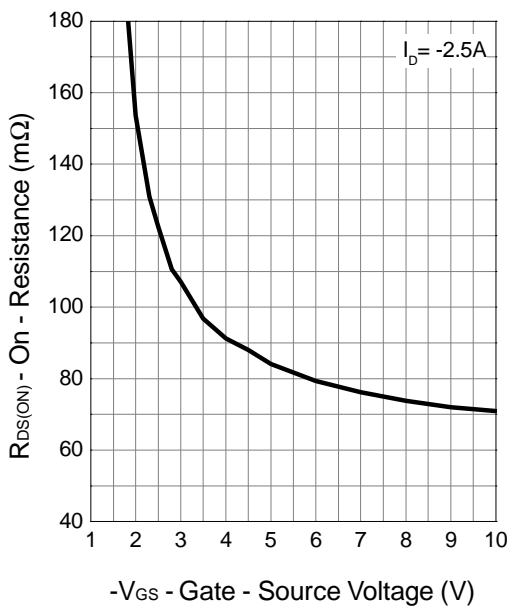
Output Characteristics



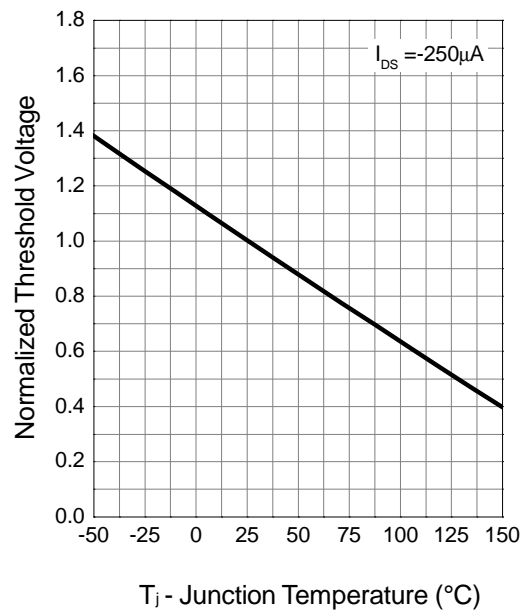
Drain-Source On Resistance



Drain-Source On Resistance

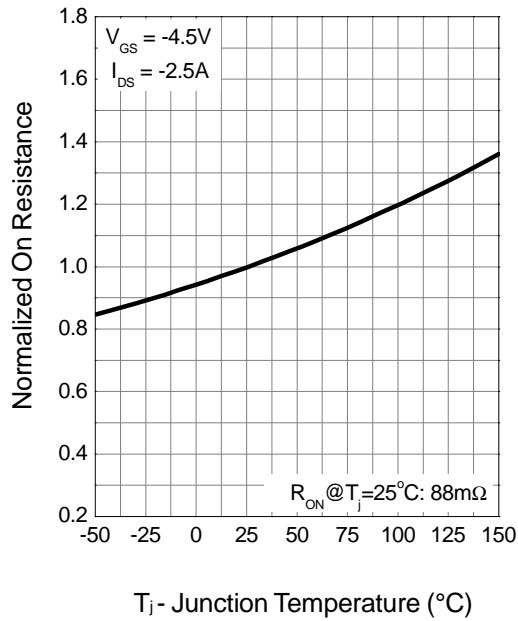


Gate Threshold Voltage

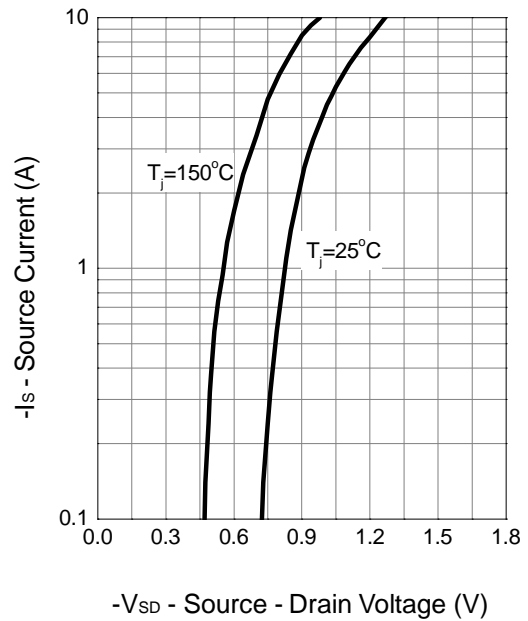


Typical Characteristics (Cont.)

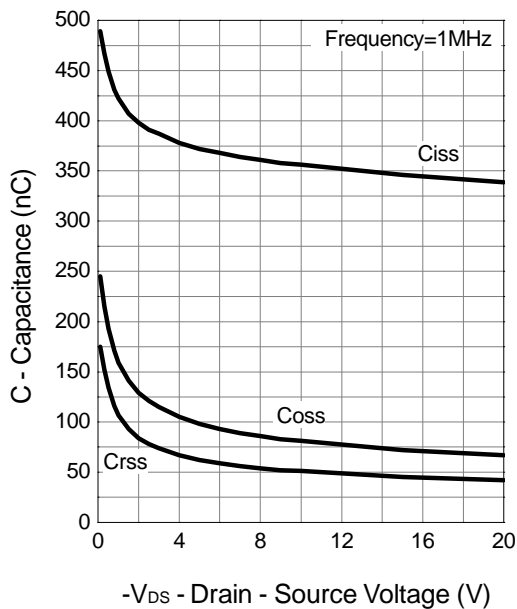
Drain-Source On Resistance



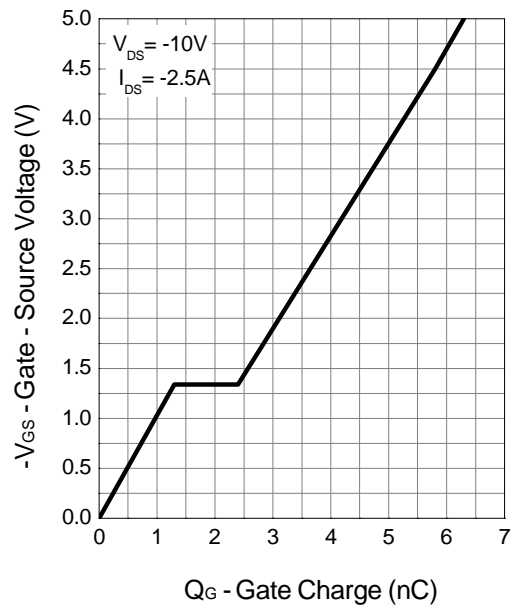
Source-Drain Diode Forward



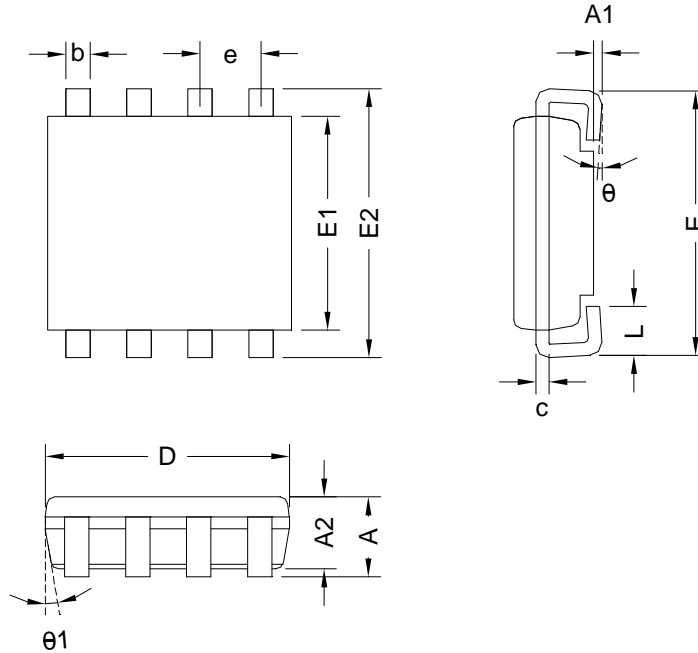
Capacitance



Gate Charge



Packaging Information



| Dim | Millimeters | | Inches | |
|-----------|-------------|------|-----------|-------|
| | Min. | Max. | Min. | Max. |
| A | - | 1.10 | - | 0.043 |
| A1 | 0.00 | 0.10 | 0.000 | 0.004 |
| A2 | 0.70 | 1.00 | 0.028 | 0.039 |
| b | 0.15 | 0.30 | 0.006 | 0.012 |
| c | 0.10 | 0.20 | 0.004 | 0.008 |
| D | 1.80 | 2.20 | 0.071 | 0.087 |
| E | 1.80 | 2.40 | 0.071 | 0.094 |
| E1 | 1.65 | 1.85 | 0.065 | 0.073 |
| E2 | 2.00 | 2.40 | 0.079 | 0.094 |
| e | 0.50 BSC | | 0.020 BSC | |
| L | 0.35 | 0.55 | 0.014 | 0.022 |
| θ | 0 | 8° | 0 | 8° |
| $\theta1$ | 4° | 10° | 4° | 10° |

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