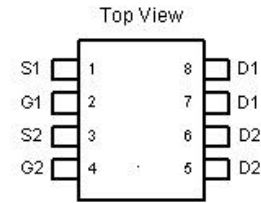


## Dual P-Channel Enhancement Mode MOSFET

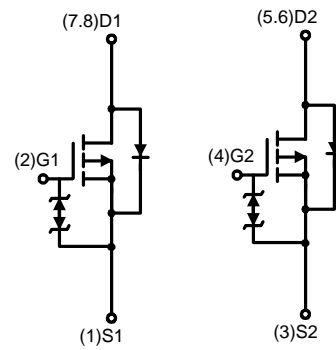
### Features

- 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 <span style="font-family: monospace;">□□-□□□</span></p> <p style="margin-left: 40px;"> <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Lead Free Code  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Handling Code  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Temp. Range  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> 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 &amp; Reel</p> <p>Lead Free Code L : Lead Free Device Blank : Original Device</p>
<p>APM2103 : <span style="border: 1px solid black; padding: 2px 10px; font-family: monospace;">M2103</span></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	$\pm 12$		
$I_D^*$	Continuous Drain Current	$V_{GS} = -4.5V$ -2.5	A	
$I_{DM}^*$	300 $\mu\text{s}$ 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 1in<sup>2</sup> 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.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_{DS} = 250\mu\text{A}$	-20			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -16V, V_{GS} = 0V$ $T_J = 85^\circ\text{C}$			-1	$\mu\text{A}$
					-30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = -250\mu\text{A}$	-0.5	-0.7	-1	V
$I_{GSS}$	Gate Leakage Current	$V_{GS} = \pm 10V, V_{DS} = 0V$			$\pm 10$	$\mu\text{A}$
$R_{DS(ON)}^a$	Drain-Source On-State Resistance	$V_{GS} = -4.5V, I_{DS} = -2.5A$		88	110	m $\Omega$
		$V_{GS} = -2.5V, I_{DS} = -2A$		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
<b>Gate Charge Characteristics<sup>b</sup></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<sub>A</sub> = 25°C unless otherwise noted)

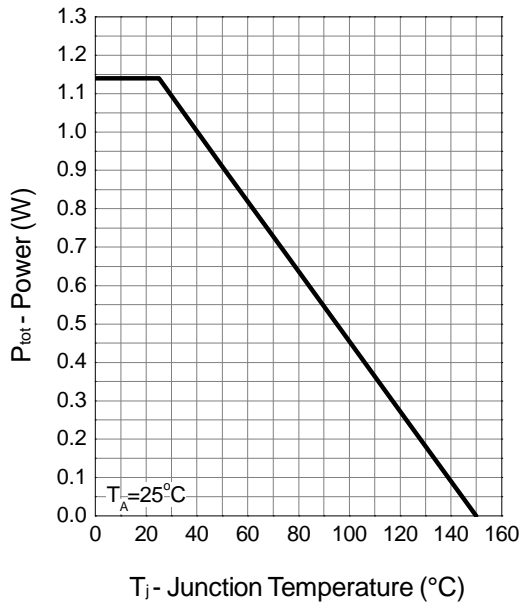
Symbol	Parameter	Test Condition	APM2103SG			Unit
			Min.	Typ.	Max.	
<b>Dynamic Characteristics<sup>b</sup></b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-10V, Frequency=1.0MHz		360		pF
C <sub>oss</sub>	Output Capacitance			80		
C <sub>rss</sub>	Reverse Transfer Capacitance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

Notes:

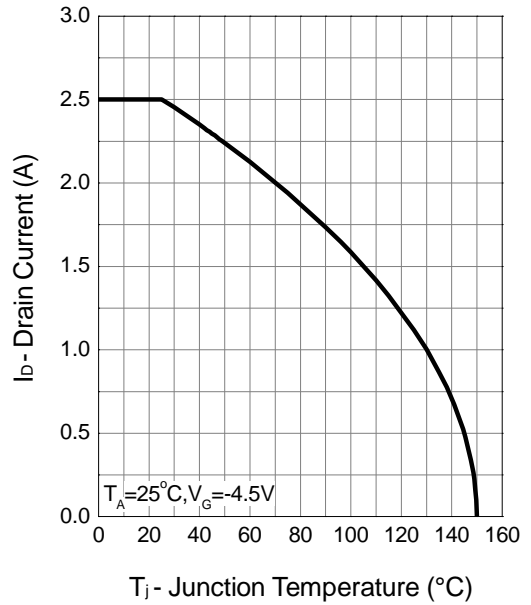
- a : Pulse test ; pulse width ≤ 300μs, duty cycle ≤ 2%.
- b : Guaranteed by design, not subject to production testing.

Typical Characteristics

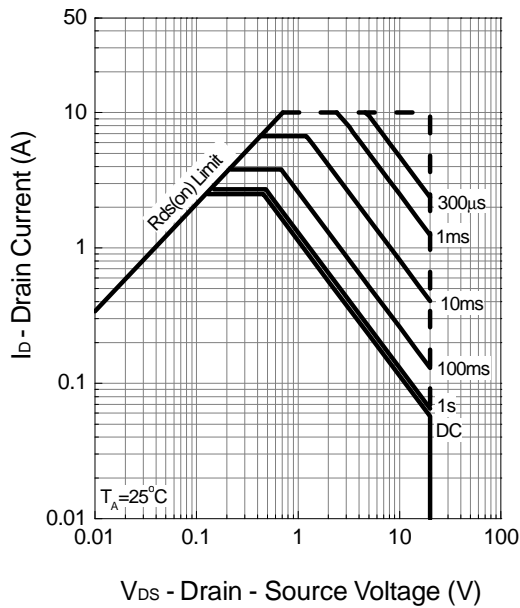
Power Dissipation



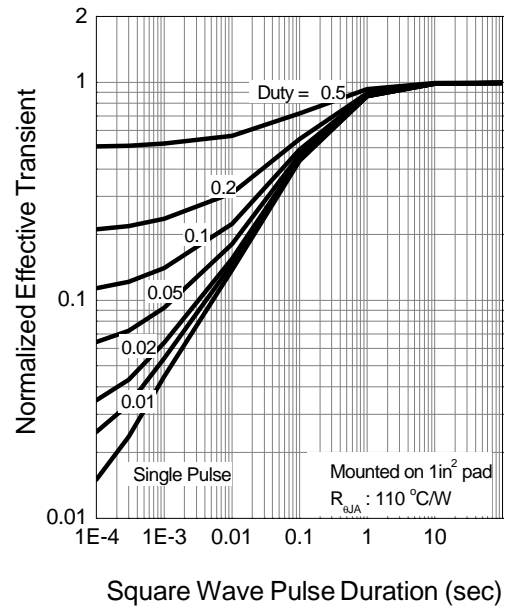
Drain Current



Safe Operation Area

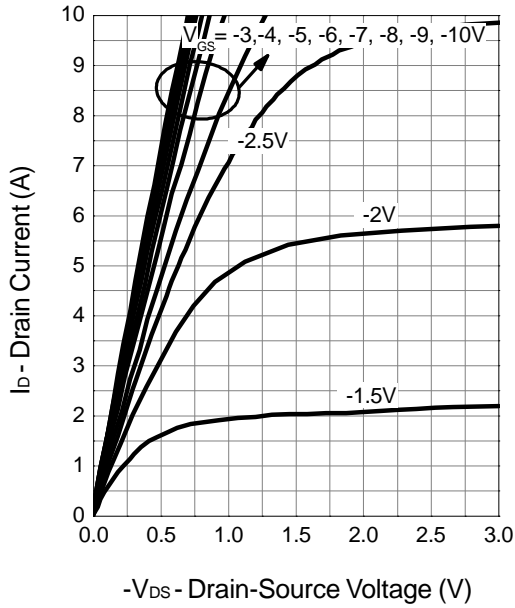


Thermal Transient Impedance

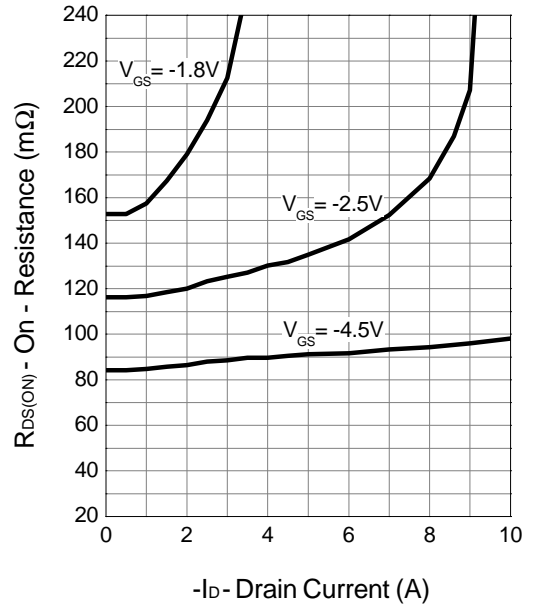


Typical Characteristics (Cont.)

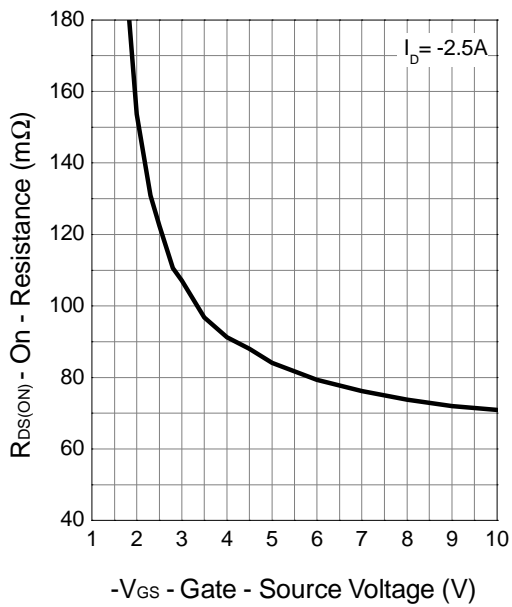
Output Characteristics



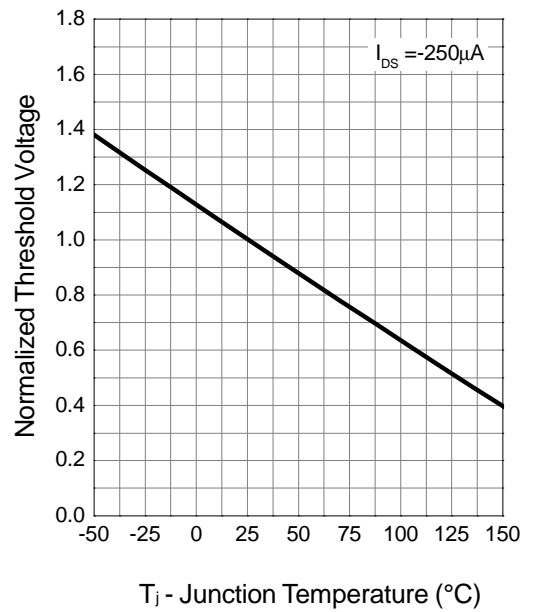
Drain-Source On Resistance



Drain-Source On Resistance

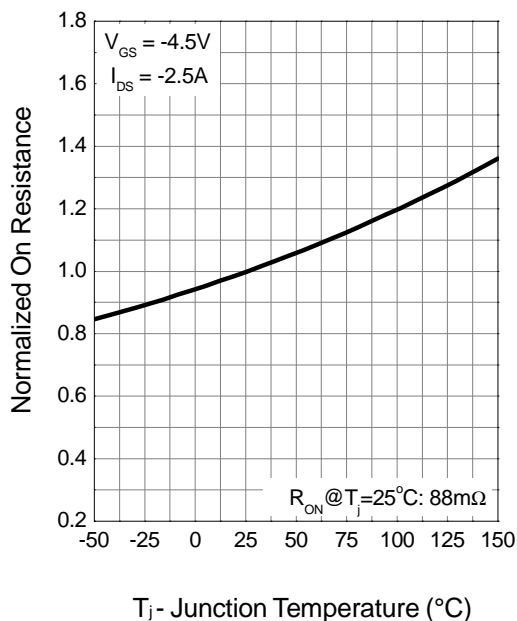


Gate Threshold Voltage

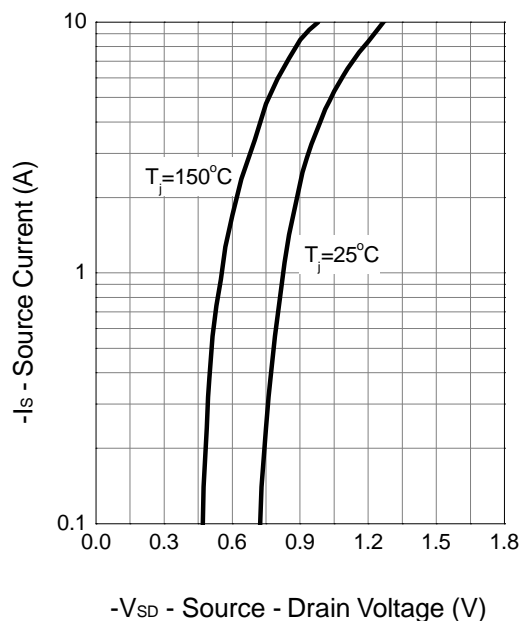


Typical Characteristics (Cont.)

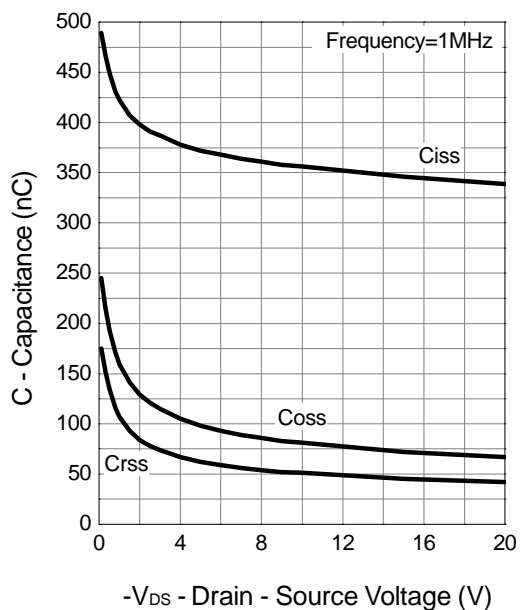
Drain-Source On Resistance



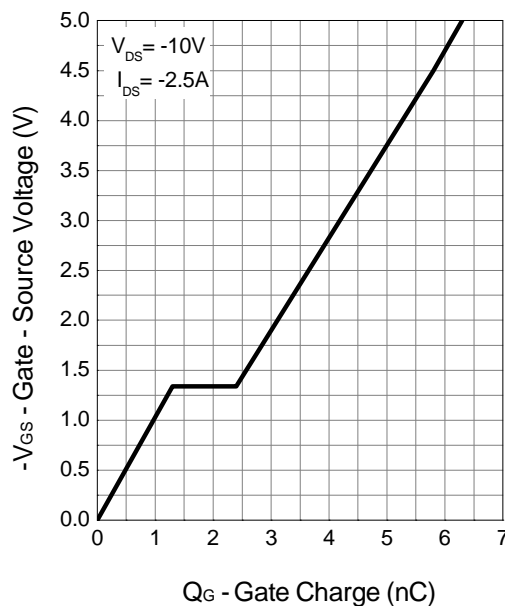
Source-Drain Diode Forward



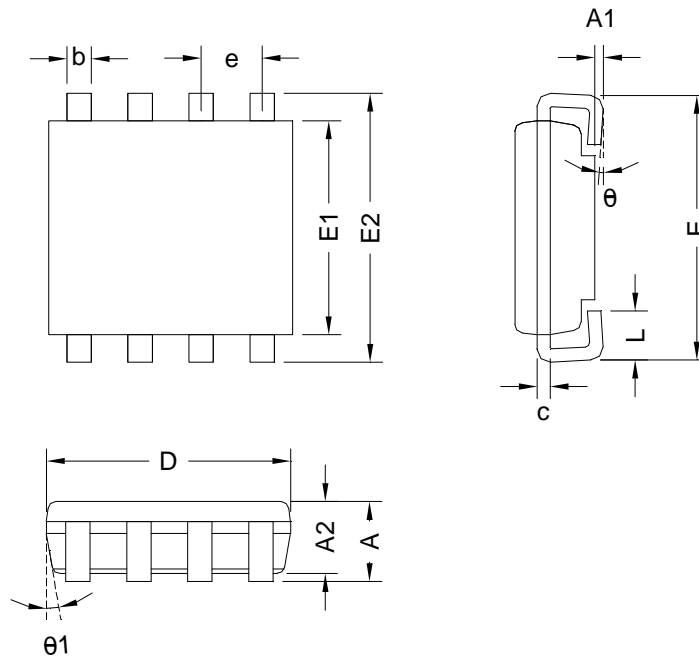
Capacitance



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
$\theta$	0	8°	0	8°
$\theta1$	4°	10°	4°	10°

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