



**Advanced Power  
Electronics Corp.**

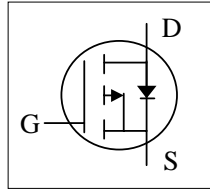
**AP9451GG**

**RoHS-compliant Product**

*P-CHANNEL ENHANCEMENT MODE*

*POWER MOSFET*

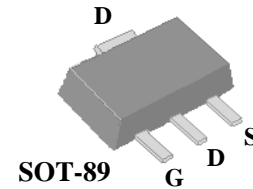
- ▼ Simple Drive Requirement
- ▼ Small Package Outline
- ▼ Capable of 2.5V Gate Drive
- ▼ RoHS Compliant



$BV_{DSS}$	-20V
$R_{DS(ON)}$	135m $\Omega$
$I_D$	-2.3A

## Description

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



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current <sup>3</sup>	-2.3	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current <sup>3</sup>	-1.9	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	-12	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation	1.25	W
	Linear Derating Factor	0.01	W/ $^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

## Thermal Data

Symbol	Parameter	Value	Unit
Rthj-a	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	100	$^\circ C/W$

Data and specifications subject to change without notice

1

201106303



**Electrical Characteristics @T<sub>j</sub>=25°C(unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-20	-	-	V
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	-	-0.02	-	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2.3A	-	-	135	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1.0A	-	-	240	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-0.5	-	-1.5	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-2.3A	-	2.3	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V	-	-	-1	uA
	Drain-Source Leakage Current (T <sub>j</sub> =70°C)	V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V	-	-	-25	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
Q <sub>g</sub>	Total Gate Charge <sup>2</sup>	I <sub>D</sub> = -2.3A V <sub>DS</sub> = -15V V <sub>GS</sub> = -4.5V	-	5.5	9	nC
Q <sub>gs</sub>	Gate-Source Charge		-	1	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge		-	2.5	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time <sup>2</sup>	V <sub>DS</sub> =-10V I <sub>D</sub> =-1A R <sub>G</sub> =3.3Ω, V <sub>GS</sub> =-5V R <sub>D</sub> =10Ω	-	9	-	ns
t <sub>r</sub>	Rise Time		-	25	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	20	-	ns
t <sub>f</sub>	Fall Time		-	10	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V V <sub>DS</sub> = -20V f=1.0MHz	-	270	430	pF
C <sub>oss</sub>	Output Capacitance		-	100	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	35	-	pF
R <sub>g</sub>	Gate Resistance	f=1.0MHz	-	8	12	Ω

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V <sub>SD</sub>	Forward On Voltage <sup>2</sup>	T <sub>j</sub> =25°C, I <sub>S</sub> =-1A, V <sub>GS</sub> =0V	-	-	-1.6	V
t <sub>rr</sub>	Reverse Recovery Time <sup>2</sup>	I <sub>S</sub> = -2.5A, V <sub>GS</sub> =0V, dI/dt=100A/μs	-	27	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	27	-	nC

**Notes:**

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Surface mount on FR4 board, t ≤ 10s.

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.

APEC DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

APEC RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN.

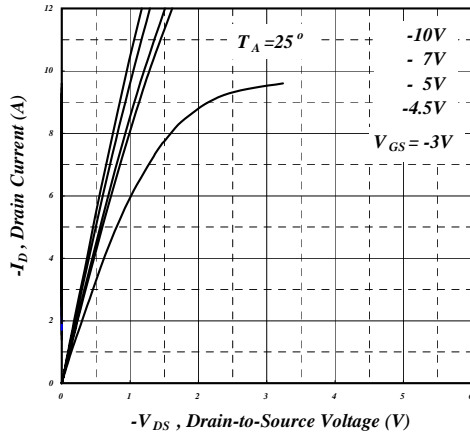


Fig 1. Typical Output Characteristics

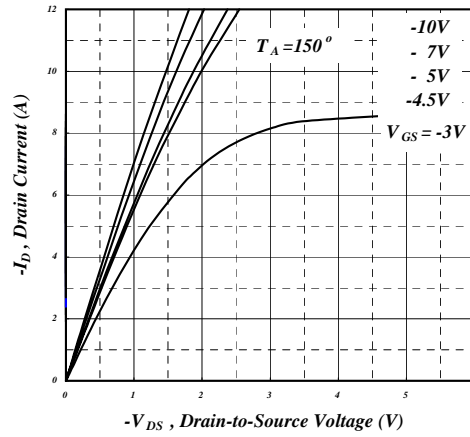


Fig 2. Typical Output Characteristics

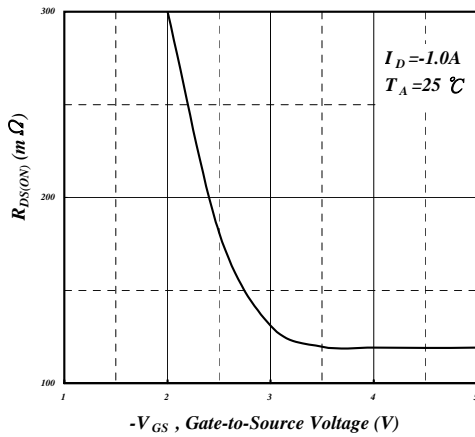


Fig 3. On-Resistance v.s. Gate Voltage

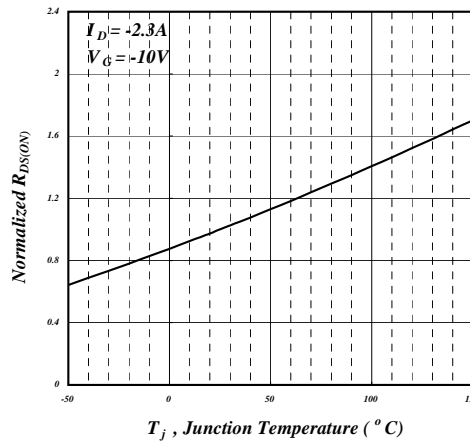


Fig 4. Normalized On-Resistance

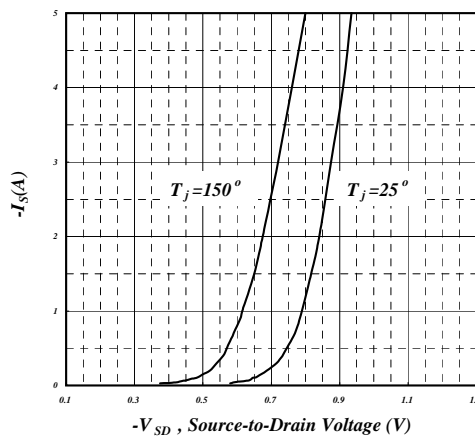


Fig 5. Forward Characteristic of Reverse Diode

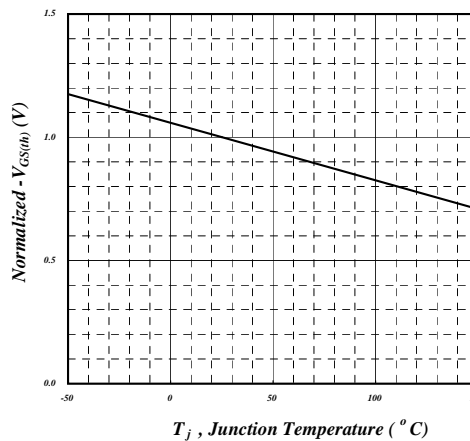


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

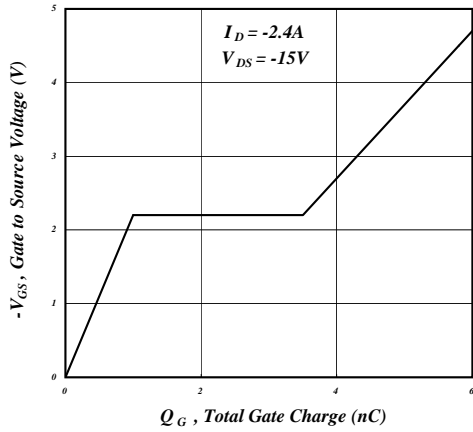


Fig 7. Gate Charge Characteristics

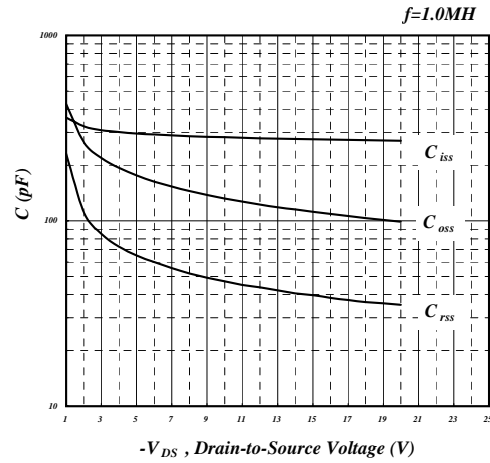


Fig 8. Typical Capacitance Characteristics

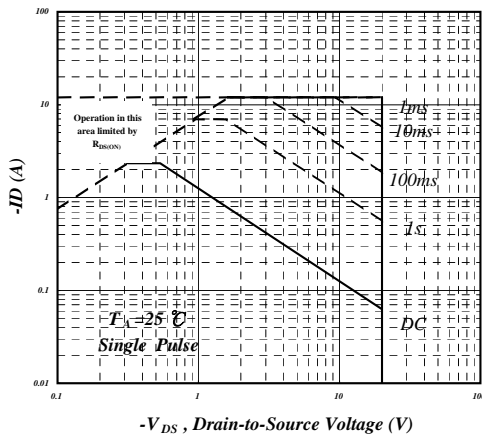


Fig 9. Maximum Safe Operating Area

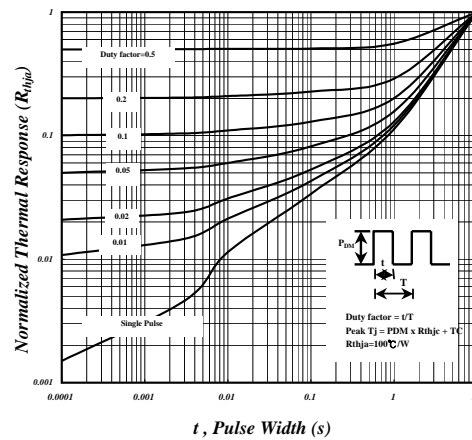


Fig 10. Effective Transient Thermal Impedance

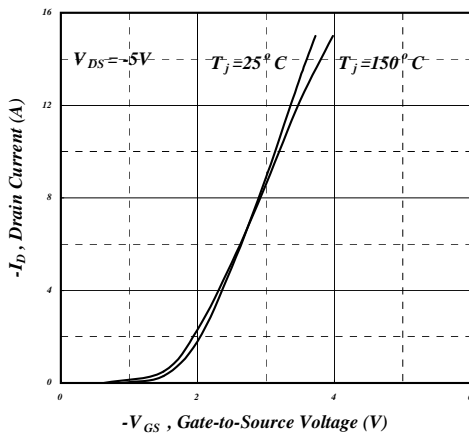


Fig 11. Transfer Characteristics

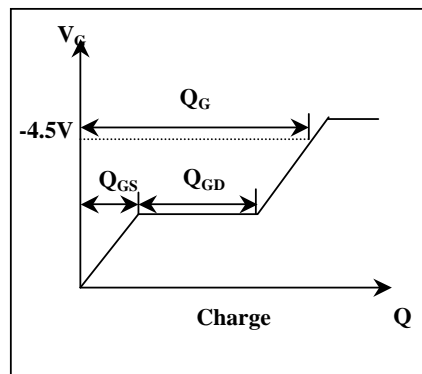


Fig 12. Gate Charge Waveform