

# AP4451GYT-HF

**Halogen-Free Product**

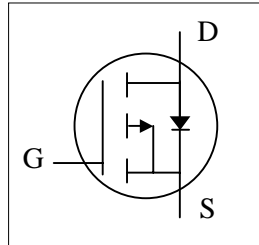


**Advanced Power Electronics Corp.**

*P-CHANNEL ENHANCEMENT MODE*

*POWER MOSFET*

- ▼ Simple Drive Requirement
- ▼ Small Size & Lower Profile
- ▼ RoHS Compliant & Halogen-Free

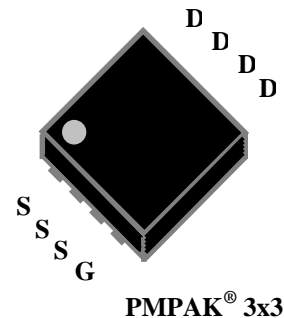


$BV_{DSS}$	-30V
$R_{DS(ON)}$	14.5m $\Omega$
$I_D$	-13.1A

## 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<sup>®</sup> 3x3 package is special for DC-DC converters application and lower 1.0mm profile with backside heat sink.



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	+20	V
$I_D@T_A=25^\circ\text{C}$	Continuous Drain Current <sup>3</sup>	-13.1	A
$I_D@T_A=70^\circ\text{C}$	Continuous Drain Current <sup>3</sup>	-10.5	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	-50	A
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation	3.57	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	Unit
Rthj-c	Maximum Thermal Resistance, Junction-case	5	$^\circ\text{C}/\text{W}$
Rthj-a	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	35	$^\circ\text{C}/\text{W}$



# AP4451GYT-HF

## 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	-30	-	-	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-10A	-	11.5	14.5	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-6A	-	19	25	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-1	-1.7	-3	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-10A	-	17	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V	-	-	-10	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Q <sub>g</sub>	Total Gate Charge <sup>2</sup>	I <sub>D</sub> =-10A	-	14	22.4	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =-15V	-	5	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =-4.5V	-	5	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time <sup>2</sup>	V <sub>DS</sub> =-15V	-	10	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =-1A	-	5.5	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =3.3Ω	-	42	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =-10V	-	30	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	1250	2000	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =-15V	-	420	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	210	-	pF
R <sub>g</sub>	Gate Resistance	f=1.0MHz	-	7.2	14.4	Ω

## Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V <sub>SD</sub>	Forward On Voltage <sup>2</sup>	I <sub>S</sub> =-2.9A, V <sub>GS</sub> =0V	-	-	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time <sup>2</sup>	I <sub>S</sub> =-10A, V <sub>GS</sub> =0V,	-	28	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	20	-	nC

### Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, t ≤10sec, 85°C/W at steady state.

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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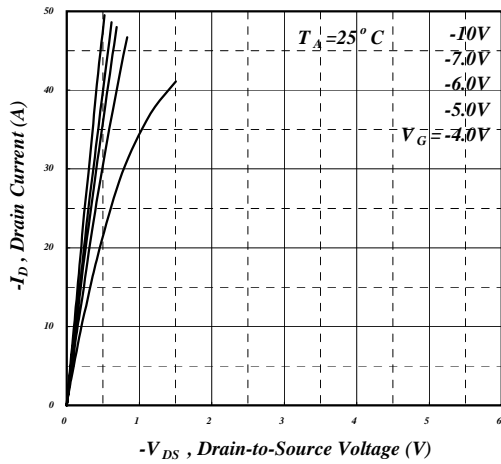


Fig 1. Typical Output Characteristics

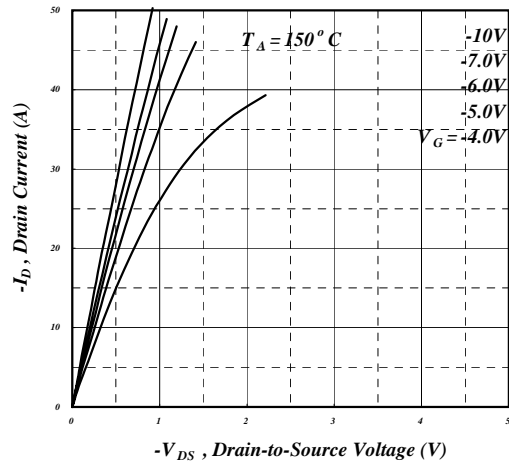


Fig 2. Typical Output Characteristics

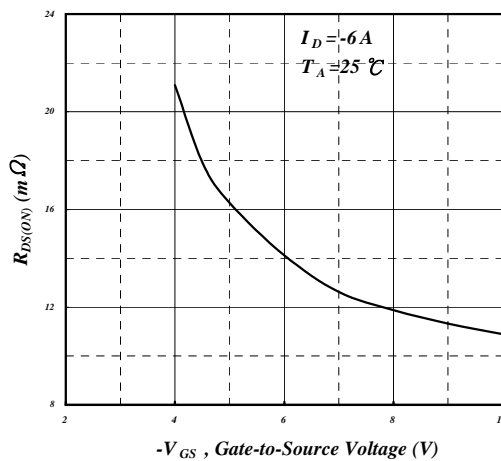


Fig 3. On-Resistance v.s. Gate Voltage

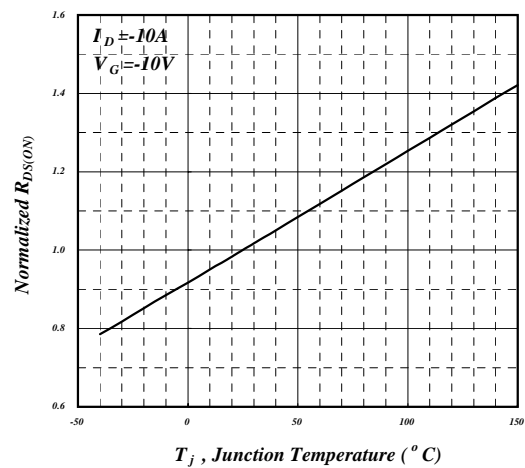


Fig 4. Normalized On-Resistance v.s. Junction Temperature

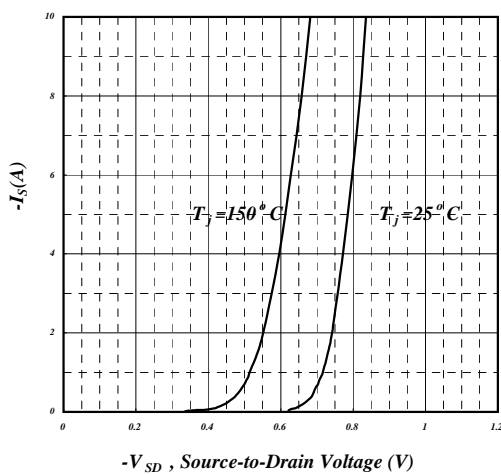


Fig 5. Forward Characteristic of Reverse Diode

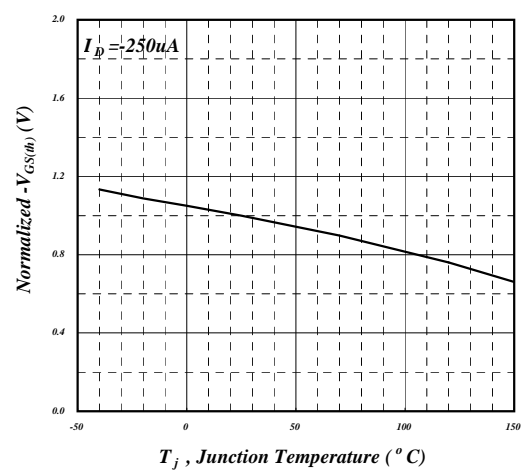


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

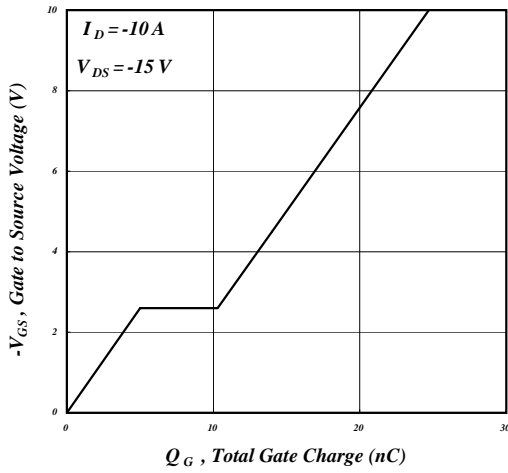


Fig 7. Gate Charge Characteristics

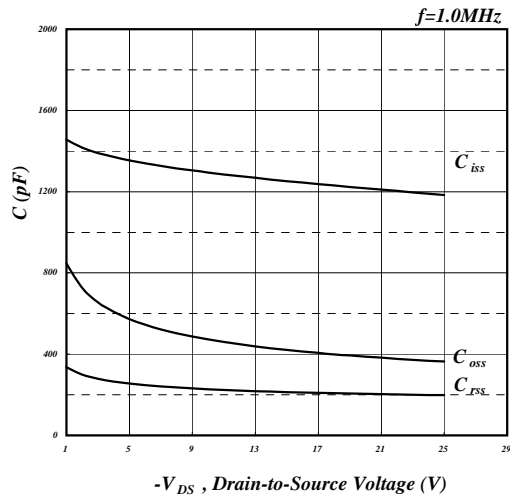


Fig 8. Typical Capacitance Characteristics

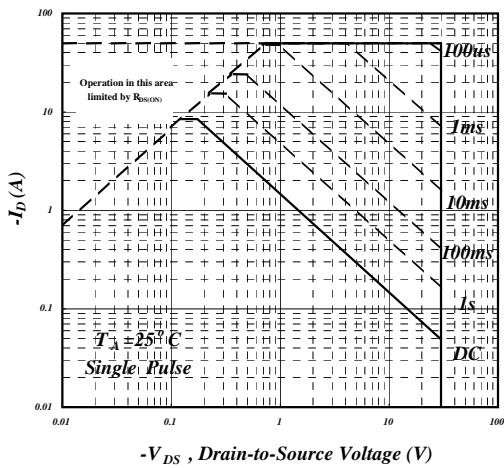


Fig 9. Maximum Safe Operating Area

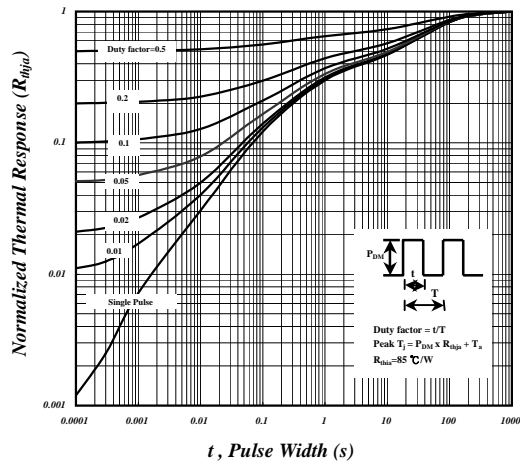


Fig 10. Effective Transient Thermal Impedance

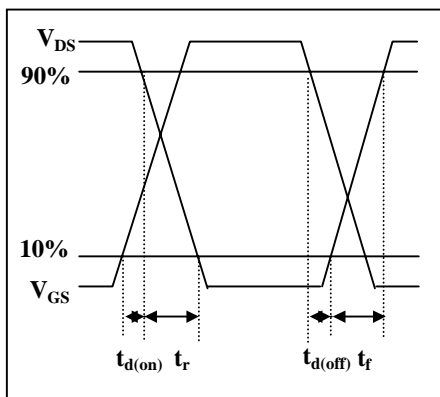


Fig 11. Switching Time Waveform

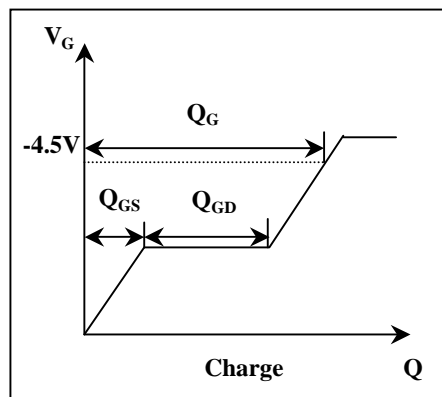


Fig 12. Gate Charge Waveform