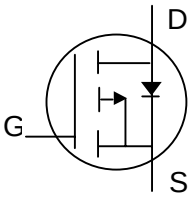
P-channel Enhancement-mode Power MOSFET

Simple Drive Requirement

Good Thermal Performance

Low On-resistance

RoHS-compliant, halogen-free

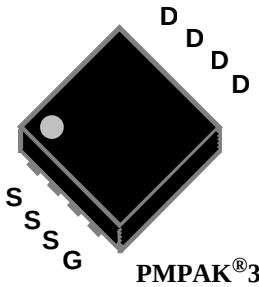


BV_{DSS}	-30V
$R_{DS(ON)}$	14.5mΩ
I_D	-13.1A

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®3x3 package is specially designed for DC-DC converter applications, with a small foot print that offers a backside heat sink and a low package profile.



PMPAK®3x3

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_A=25°C	Continuous Drain Current[3]	-13.1	A
I_D at T_A=70°C	Continuous Drain Current[3]	-10.5	A
I_{DM}	Pulsed Drain Current[1]	-50	A
P_D at T_A=25°C	Total Power Dissipation	3.57	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Value	Units
Rthj-c	Maximum Thermal Resistance, Junction-case	5	°C/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient[3]	35	°C/W

Ordering Information

AP4451GYT-HF-3TR **RoHS-compliant halogen-free PMPAK®3x3, shipped on tape and reel (3000pcs/reel)**

PMPAK® is a registered trademark of Advanced Power Electronics Corp.

Electrical Specifications at T_j=25°C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250uA	-30	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V, I_D=-10A	-	11.5	14.5	mΩ
		V_{GS}=-4.5V, I_D=-6A	-	19	25	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250uA	-1	-1.7	-3	V
g_{fs}	Forward Transconductance	V_{DS}=-10V, I_D=-10A	-	17	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-24V, V_{GS}=0V	-	-	-10	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D=-10A	-	14	22.4	nC
Q_{gs}	Gate-Source Charge	V_{DS}=-15V	-	5	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=-4.5V	-	5	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=-15V	-	10	-	ns
t_r	Rise Time	I_D=-1A	-	5.5	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω	-	42	-	ns
t_f	Fall Time	V_{GS}=-10V	-	30	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	1250	2000	pF
C_{oss}	Output Capacitance	V_{DS}=-15V	-	420	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	210	-	pF
R_g	Gate Resistance	f=1.0MHz	-	7.2	14.4	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=-2.9A, V_{GS}=0V	-	-	-1.2	V
t_{rr}	Reverse Recovery Time[2]	I_S=-10A, V_{GS}=0V,	-	28	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	20	-	nC

Notes:

1.Pulse width limited by maximum junction temperature

2.Pulse test

3.Surface mounted on 1 in^2 copper pad of FR4 board, t ≤10sec, 85°C at steady state.

Typical Electrical Characteristics

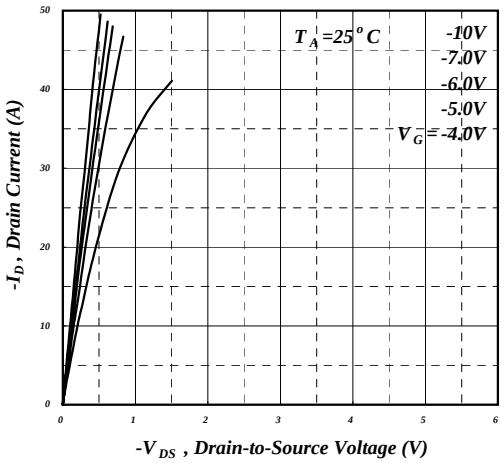


Fig 1. Typical Output Characteristics

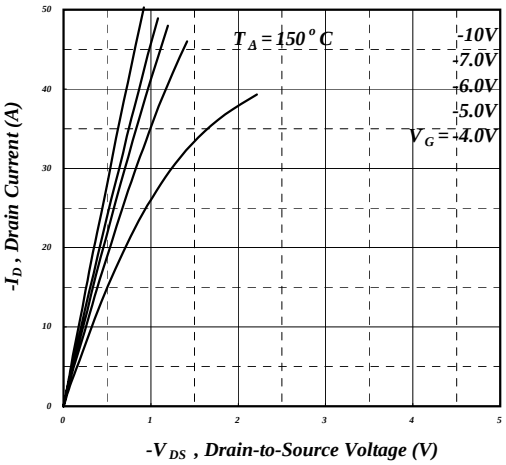


Fig 2. Typical Output Characteristics

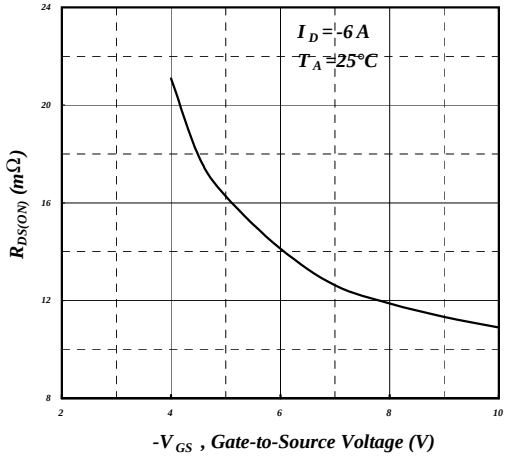


Fig 3. On-Resistance vs. Gate Voltage

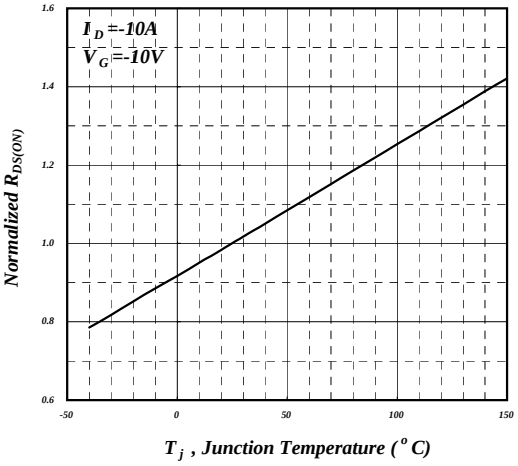


Fig 4. Normalized On-Resistance vs. Junction Temperature

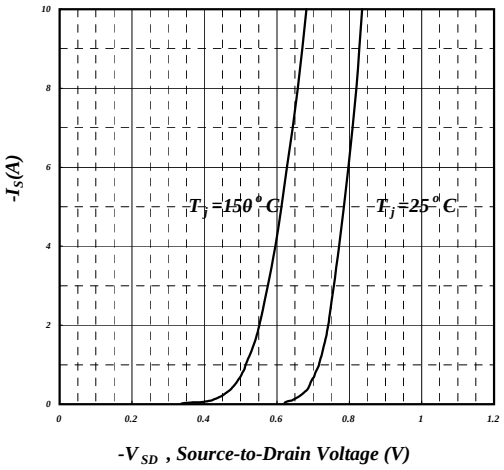


Fig 5. Forward Characteristic of Reverse Diode

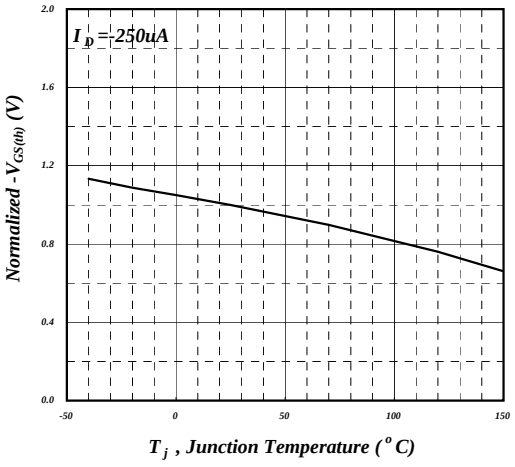


Fig 6. Gate Threshold Voltage vs. Junction Temperature

Typical Electrical Characteristics (cont.)

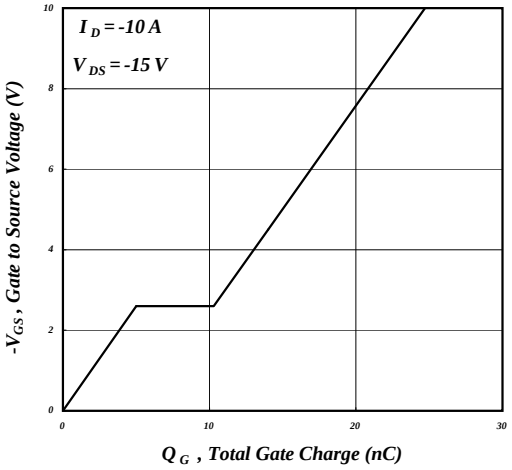


Fig 7. Gate Charge Characteristics

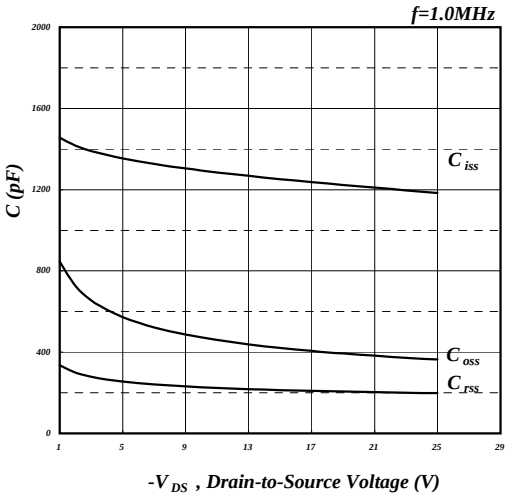


Fig 8. Typical Capacitance Characteristics

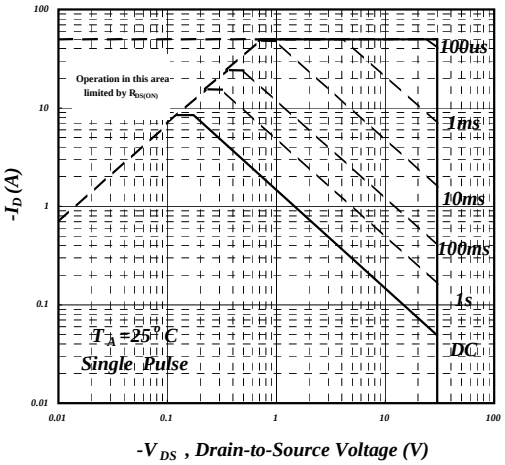


Fig 9. Maximum Safe Operating Area

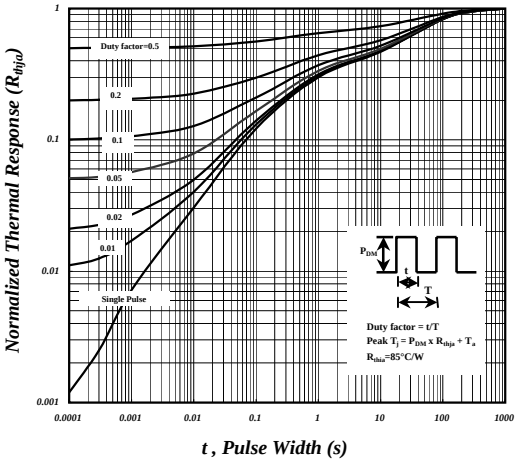


Fig 10. Effective Transient Thermal Impedance

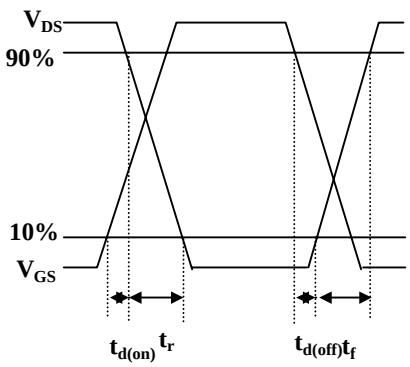


Fig 11. Switching Time Waveforms

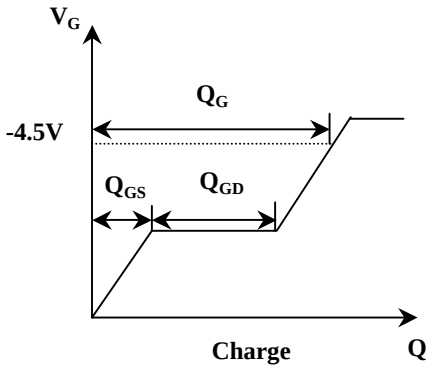
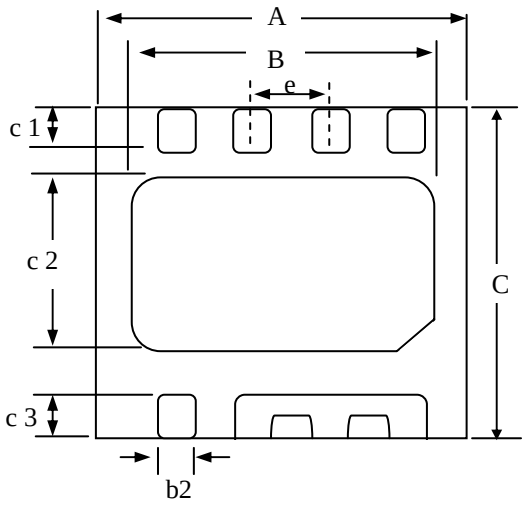
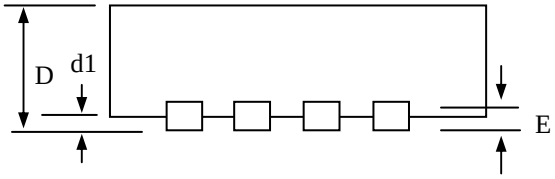


Fig 12. Gate Charge Waveform

Package Dimensions: PMPAK®3x3

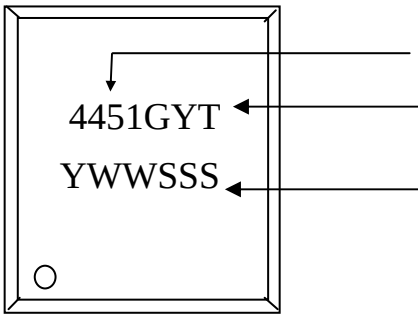


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	2.95	3.00	3.05
B	2.35	2.40	2.45
e	0.65 (ref.)		
b2	0.30	0.35	0.40
C	2.95	3.00	3.05
c1	0.37	0.42	0.47
c2	1.65	1.70	1.75
c3	0.37	0.42	0.47
D	0.80	0.85	0.95
d1	0.00	-	0.05
E	0.178	0.203	0.228



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

Marking Information:



Product: AP4451

Package code:
GYT = RoHS-compliant halogen-free PMPAK®3x3

Date Code (YWWSSS)
Y: Last Digit Of The Year
WW: Work week
SSS: Lot code sequence