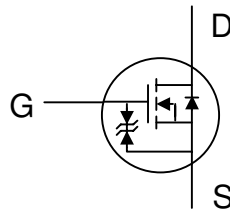




N-channel Enhancement-mode Power MOSFET

- Simple Drive Requirement**
- Good Thermal Performance**
- Low On-resistance**
- RoHS-compliant, halogen-free**

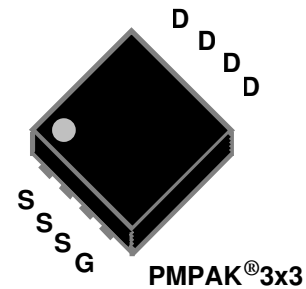


BV_{DSS}	40V
$R_{DS(ON)}$	21mΩ
I_D	10A

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 1.0mm package profile.



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	±16	V
I_D at $T_A=25^\circ\text{C}$	Continuous Drain Current ³	10	A
I_D at $T_A=70^\circ\text{C}$	Continuous Drain Current ³	8.0	A
I_{DM}	Pulsed Drain Current ¹	40	A
P_D at $T_A=25^\circ\text{C}$	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 ³	5	°C/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient ³	35	°C/W

Ordering Information

AP9965GYT-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 $T_j=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=9A$	-	17	21	m Ω
		$V_{GS}=4.5V, I_D=5A$	-	22	28	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.8	1.4	2.5	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=9A$	-	21	-	S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=32V, V_{GS}=0V$	-	-	10	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 16V, V_{DS}=0V$	-	-	± 30	μA
Q_g	Total Gate Charge	$I_D=9A$	-	7.5	12	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=20V$	-	2	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	3.5	-	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=20V$	-	7	-	ns
t_r	Rise Time	$I_D=1A$	-	5	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega$	-	19	-	ns
t_f	Fall Time	$V_{GS}=10V$	-	4	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	700	1120	pF
C_{oss}	Output Capacitance	$V_{DS}=15V$	-	115	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	70	-	pF
R_g	Gate Resistance	$f=1.0\text{MHz}$	-	1.4	2.8	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	$I_S=9A, V_{GS}=0V,$	-	18	-	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$	-	10	-	nC

Notes:

1. Pulse width limited by maximum junction temperature
2. Pulse test
3. Surface mounted on 1 in² copper pad of FR4 board, $t \leq 10\text{sec}$, 160°C/W when mounted on min. copper pad.

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.



Typical Electrical Characteristics

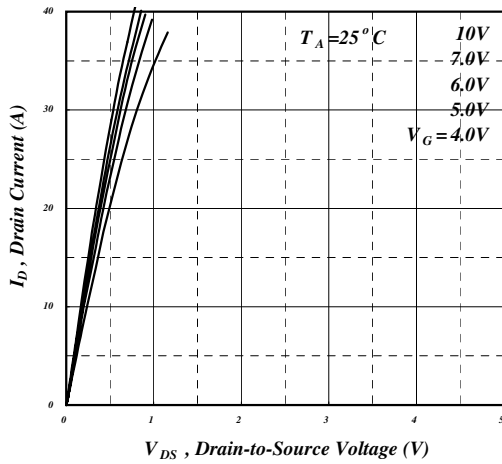


Fig 1. Typical Output Characteristics

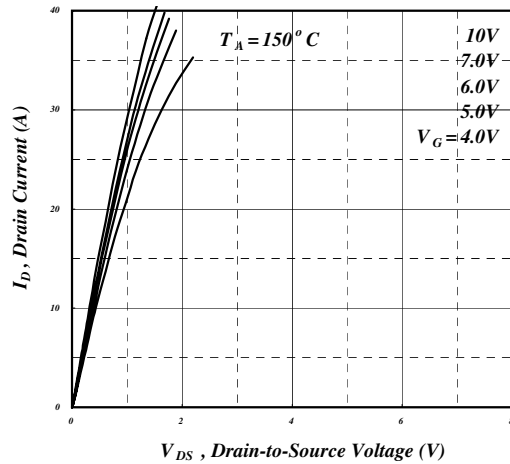


Fig 2. Typical Output Characteristics

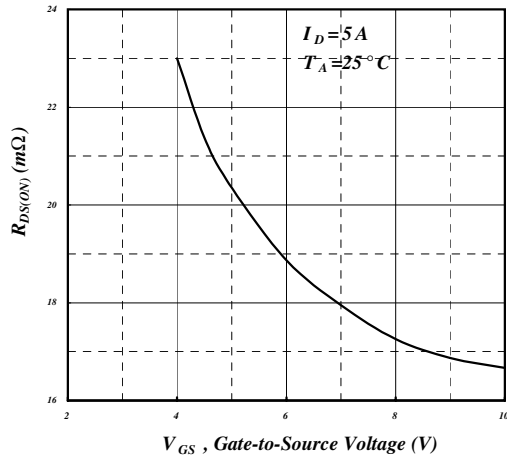


Fig 3. On-Resistance vs. Gate Voltage

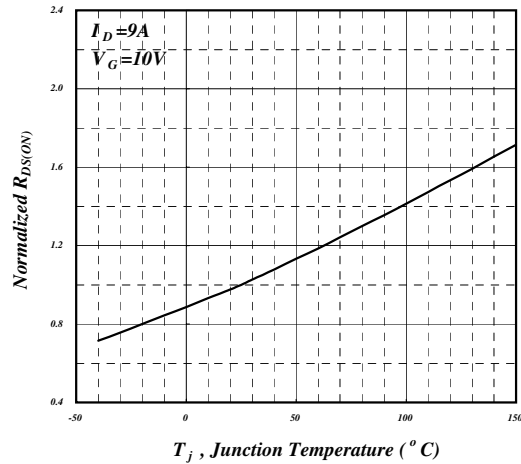


Fig 4. Normalized On-Resistance vs. Junction Temperature

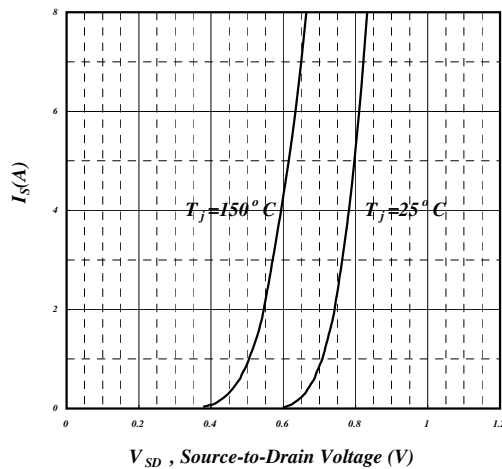


Fig 5. Forward Characteristic of Reverse Diode

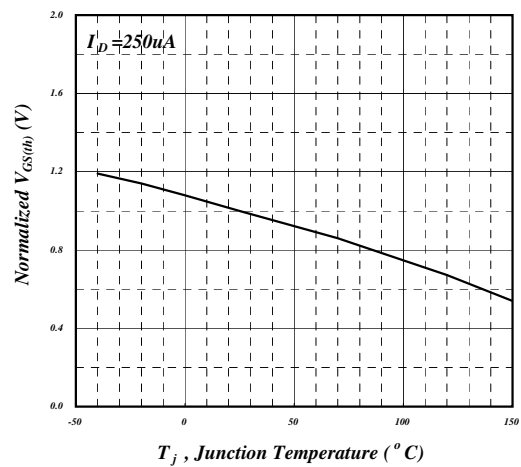


Fig 6. Gate Threshold Voltage vs. Junction Temperature



Typical Electrical Characteristics (cont.)

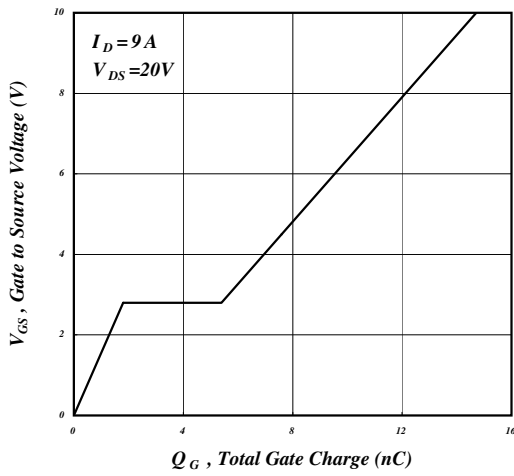


Fig 7. Gate Charge Characteristics

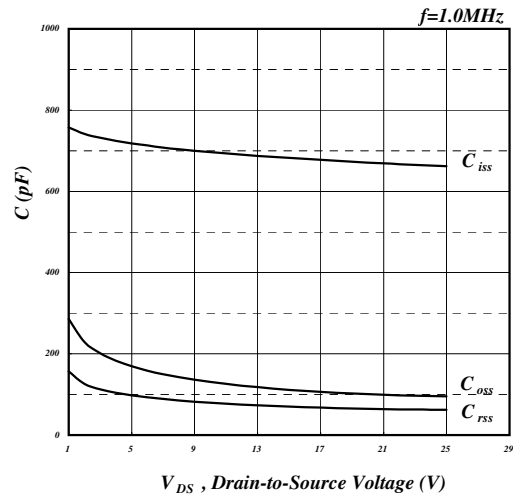


Fig 8. Typical Capacitance Characteristics

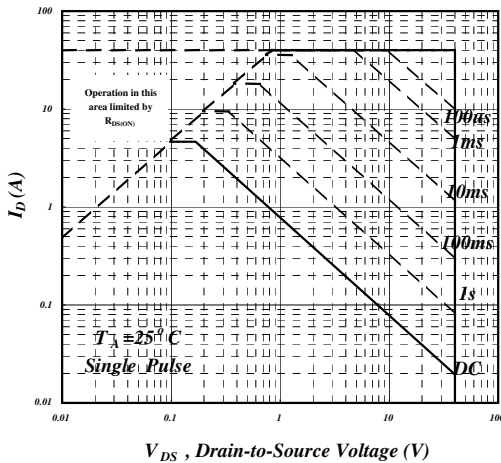


Fig 9. Maximum Safe Operating Area

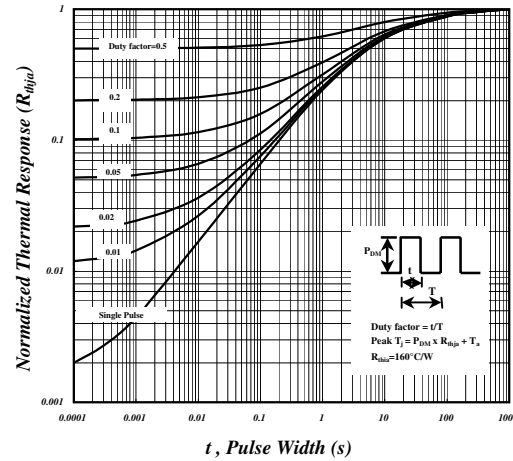


Fig 10. Effective Transient Thermal Impedance

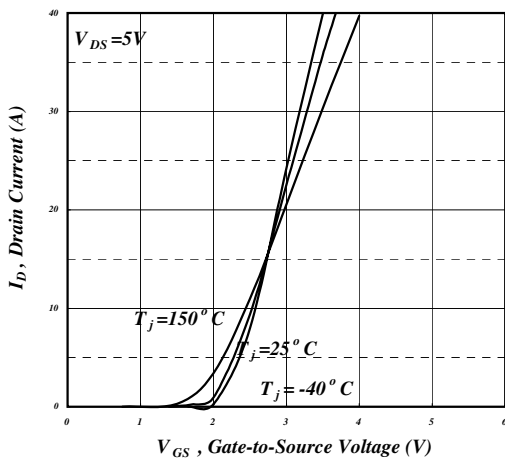


Fig 11. Transfer Characteristics

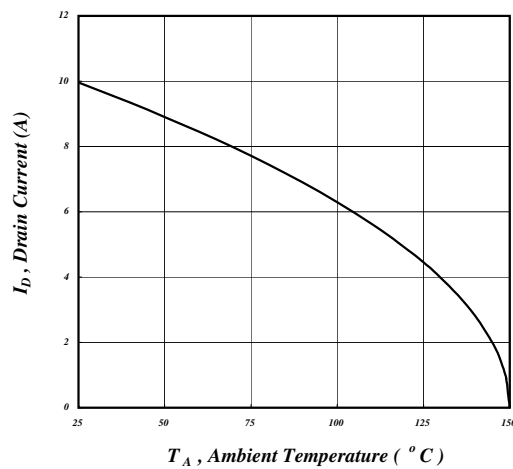
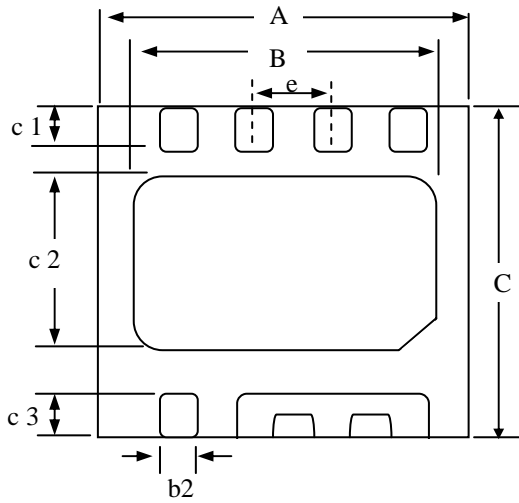


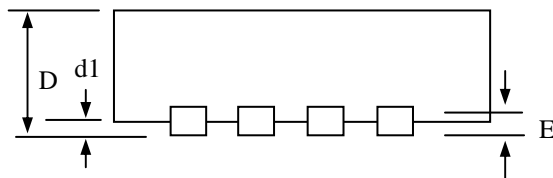
Fig 12. Maximum Continuous Drain Current vs. Ambient Temperature



Package Dimensions: PMPAK[®]3x3

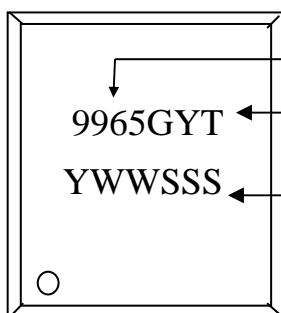


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	2.95	3.00	3.05
B	2.35	2.40	2.45
e	0.65 (ref.)		
b2	0.30	0.35	0.40
C	2.95	3.00	3.05
c1	0.37	0.42	0.47
c2	1.65	1.70	1.75
c3	0.37	0.42	0.47
D	0.80	0.85	0.95
d1	0.00	-	0.05
E	0.178	0.203	0.228



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

Marking Information:



Product: AP9965
 Package code: 9965GYT
 GYT = RoHS-compliant halogen-free PMPAK[®]3x3
 Date Code (YWWSSS)
 Y: Last Digit Of The Year
 WW: Work week
 SSS: Lot code sequence