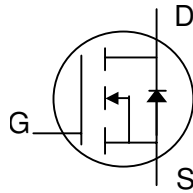




**N-channel Enhancement-mode Power MOSFET**

- 100% Avalanche-Tested**
- Simple Drive Requirement**
- Fast Switching Performance**
- RoHS-compliant, halogen-free**



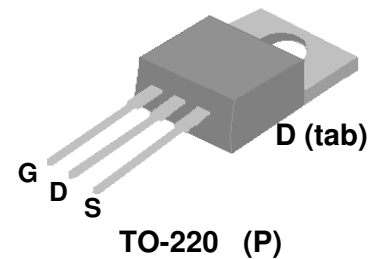
$BV_{DS}$	400V
$R_{DS(ON)}$	2.6Ω
$I_D$	2.7A

**Description**

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

The AP03N40AP-HF-3 is in the TO-220 through-hole package which is widely used for commercial and industrial applications.

This device is well suited for use in high voltage applications such as AC/DC converters.



**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	400	V
$V_{GS}$	Gate-Source Voltage	±20	V
$I_D$ at $T_C=25^\circ C$	Continuous Drain Current	2.7	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	10	A
$P_D$ at $T_C=25^\circ C$	Total Power Dissipation	44.6	W
$P_D$ at $T_A=25^\circ C$	Total Power Dissipation	2	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	2.8	°C/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient	62	°C/W

**Ordering Information**

**AP03N40AP-HF-3TB** : in RoHS-compliant halogen-free TO-220, shipped in tubes (50 pieces per tube)



**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	$V_{GS}=0V, I_D=250\mu A$	400	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V, I_D=1.3A$	-	-	2.6	$\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	-	4	V
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=1.3A$	-	2	-	S
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=320V, V_{GS}=0V$	-	-	25	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=1A$	-	11	17.5	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=320V$	-	2.5	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=10V$	-	5	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>2</sup>	$V_{DD}=200V$	-	8	-	ns
$t_r$	Rise Time	$I_D=1A$	-	4.5	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega$	-	17	-	ns
$t_f$	Fall Time	$V_{GS}=10V$	-	10	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	370	600	pF
$C_{oss}$	Output Capacitance	$V_{DS}=25V$	-	45	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	9	-	pF
$R_g$	Gate Resistance	$f=1.0\text{MHz}$	-	3.2	6.4	$\Omega$

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Forward On Voltage <sup>2</sup>	$I_S=1.3A, V_{GS}=0V$	-	-	1.5	V
$t_{rr}$	Reverse Recovery Time <sup>2</sup>	$I_S=1A, V_{GS}=0V,$	-	150	-	ns
$Q_{rr}$	Reverse Recovery Charge	$dI/dt=100A/\mu s$	-	820	-	nC

**Notes:**

- 1.Pulse width limited by maximum junction temperature.
- 2.Pulse test

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

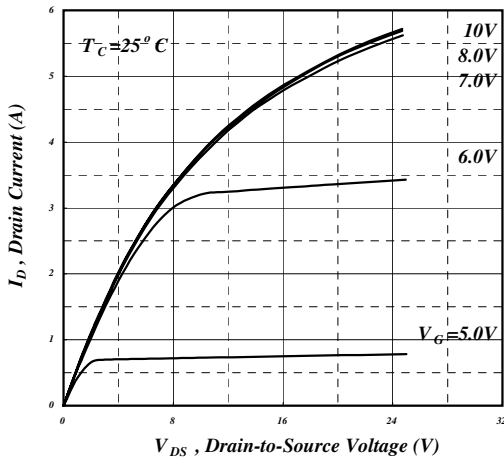


Fig 1. Typical Output Characteristics

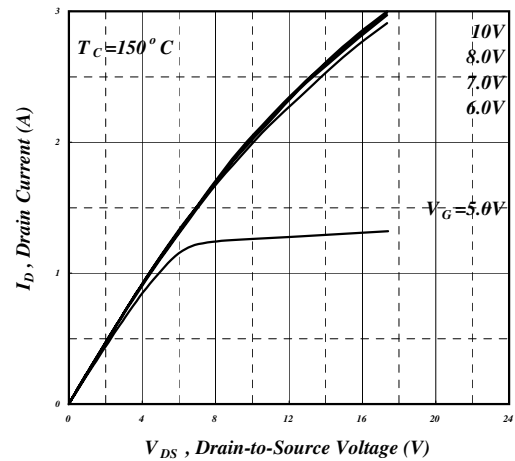


Fig 2. Typical Output Characteristics

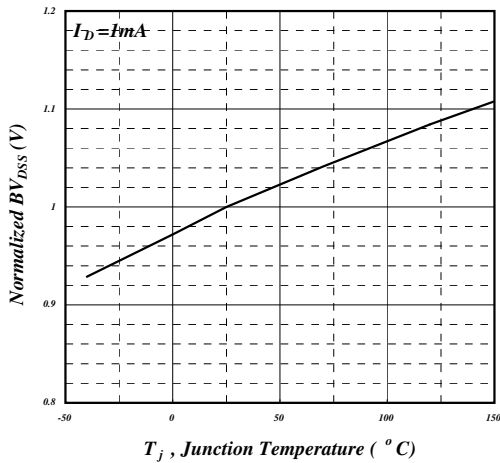


Fig 3. Normalized  $BV_{DS}$  vs. Junction Temperature

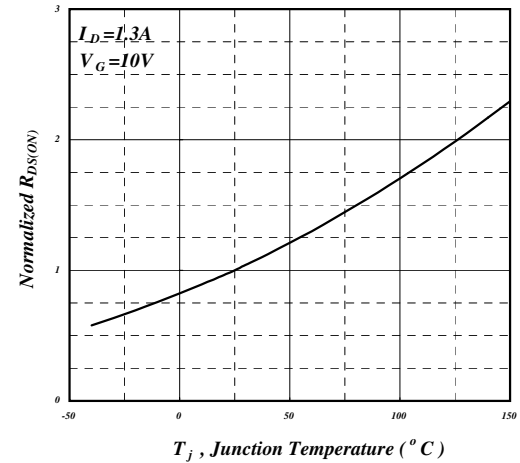


Fig 4. Normalized On-Resistance vs. Junction Temperature

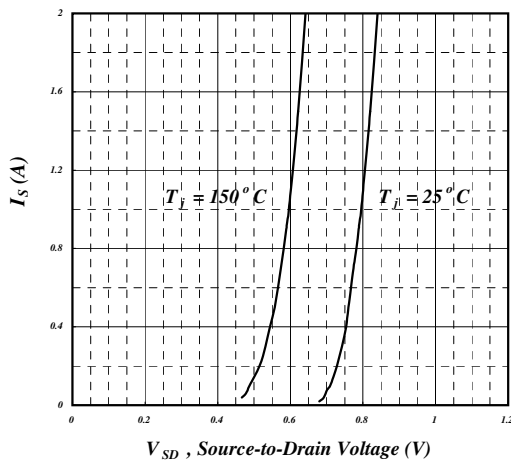


Fig 5. Forward Characteristic of Reverse Diode

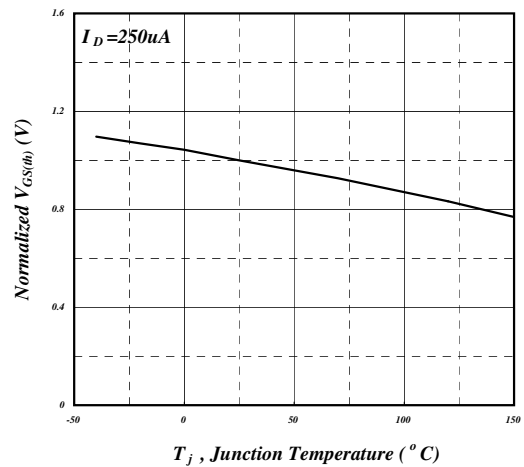


Fig 6. Gate Threshold Voltage vs. Junction Temperature



Typical Electrical Characteristics (cont.)

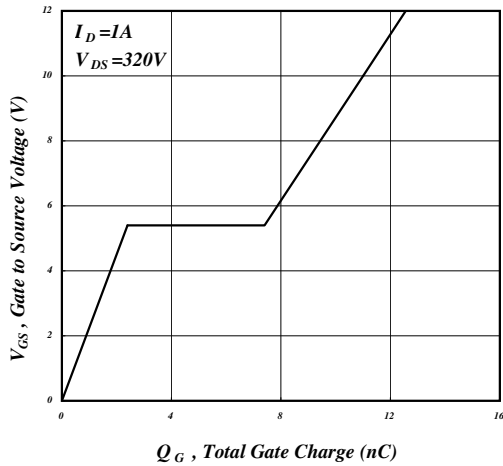


Fig 7. Gate Charge Characteristics

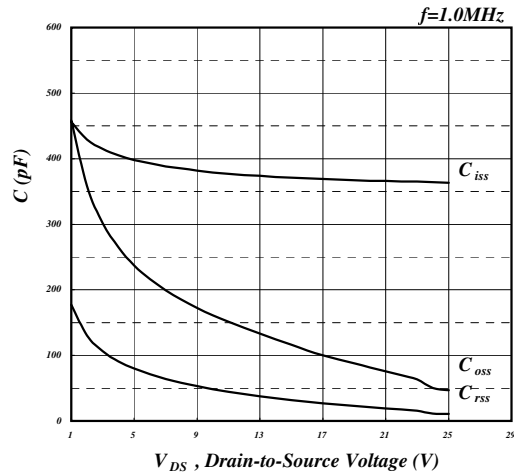


Fig 8. Typical Capacitance Characteristics

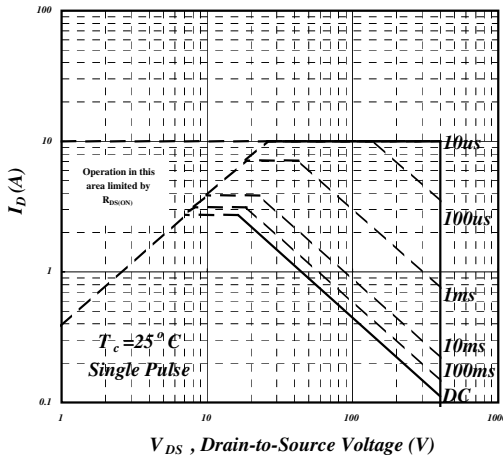


Fig 9. Maximum Safe Operating Area

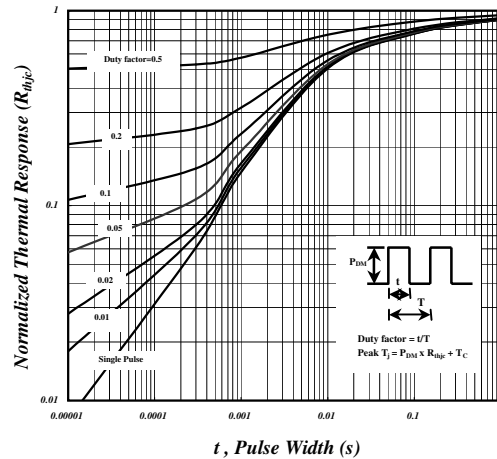


Fig 10. Effective Transient Thermal Impedance

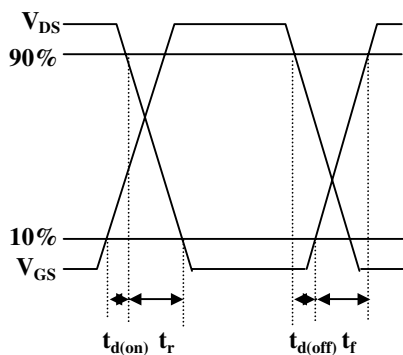


Fig 11. Switching Time Waveforms

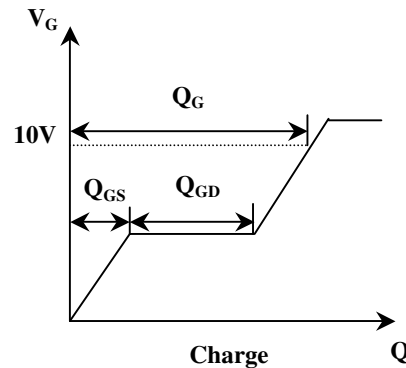
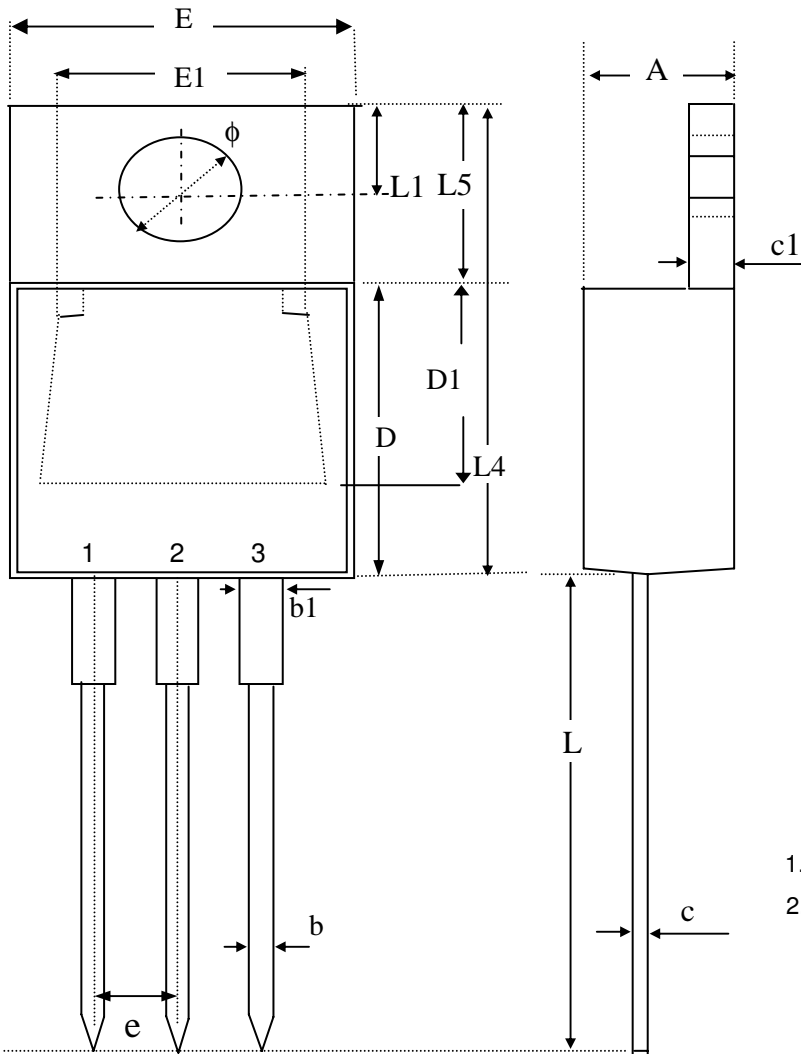


Fig 12. Gate Charge Waveform



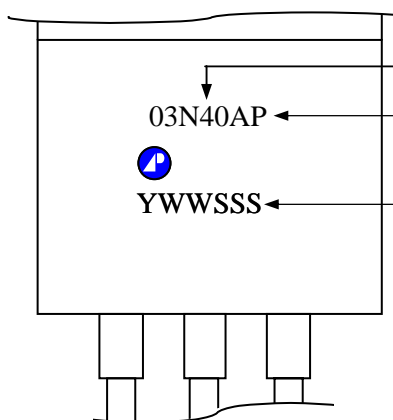
**Package Dimensions: TO-220**



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.40	4.60	4.80
b	0.76	0.88	1.00
D	8.60	8.80	9.00
c	0.36	0.43	0.50
E	9.80	10.10	10.40
L4	14.70	15.00	15.30
L5	6.20	6.40	6.60
D1	5.10 REF.		
c1	1.25	1.35	1.45
b1	1.17	1.32	1.47
L	13.25	13.75	14.25
e	2.54 REF.		
L1	2.60	2.75	2.89
phi	3.71	3.84	3.96
E1	7.4 REF.		

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

**Marking Information:**



Product: AP03N40A

03N40AP

Package code: P = RoHS-compliant halogen-free TO-220



YWWSSS

Date Code (YWWSSS)

Y : Last digit of the year

WW : Work week

SSS : Lot code sequence