



N-channel Enhancement-mode Power MOSFET

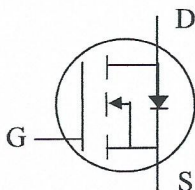
Fast Switching Characteristics

Low Gate Charge

Simple Drive Requirement

100% Avalanche-tested

RoHS-compliant, halogen-free SOT-89 package



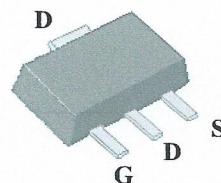
BV_{DSS}	400V
$R_{DS(ON)}$	16Ω
I_D	200mA

Description

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

The AP01N40G-HF-3 is in the popular SOT-89 small package which is widely used in commercial and industrial applications where a small board footprint is required.

This device is well suited for use in low current applications such as small switching power supplies and load switches.



SOT-89 (G)

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	400	V
V_{GS}	Gate-Source Voltage	±20	V
I_D at $T_A=25^{\circ}C$	Continuous Drain Current	0.2	A
I_D at $T_A=70^{\circ}C$	Continuous Drain Current	0.14	A
I_{DM}	Pulsed Drain Current ¹	0.8	A
P_D at $T_A=25^{\circ}C$	Total Power Dissipation	1.25	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-a	Maximum Thermal Resistance, Junction-ambient ³	100	°C/W

Ordering Information

AP01N40G-HF-3TR : in RoHS-compliant halogen-free SOT-89, shipped on tape and reel, 1000pcs/reel



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 ²	$V_{GS}=10V, I_D=0.2A$	-	-	16	Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=0.2A$	-	0.2	-	S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=400V, V_{GS}=0V$	-	-	10	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Q_g	Total Gate Charge ²	$I_D=1A$	-	2.9	4.6	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=320V$	-	0.6	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=10V$	-	0.6	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DD}=200V$	-	7.7	-	ns
t_r	Rise Time	$I_D=1A$	-	12	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega$	-	23	-	ns
t_f	Fall Time	$V_{GS}=10V$	-	73	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	76	125	pF
C_{oss}	Output Capacitance	$V_{DS}=25V$	-	11	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	4	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ²	$I_S=0.8A, V_{GS}=0V$	-	-	1.5	V
t_{rr}	Reverse Recovery Time ²	$I_S=1A, V_{GS}=0V$	-	260	-	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$	-	460	-	nC

Notes:

1. Pulse width limited by maximum 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.



Typical Electrical Characteristics

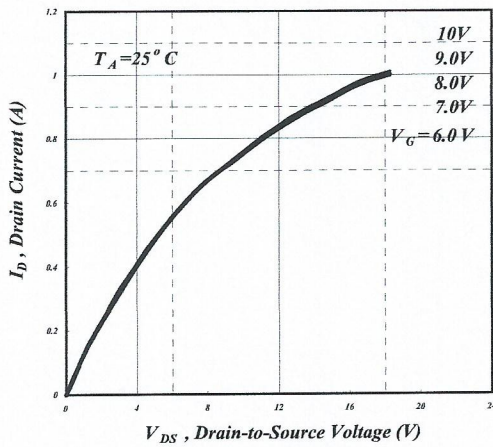


Fig 1. Typical Output Characteristics

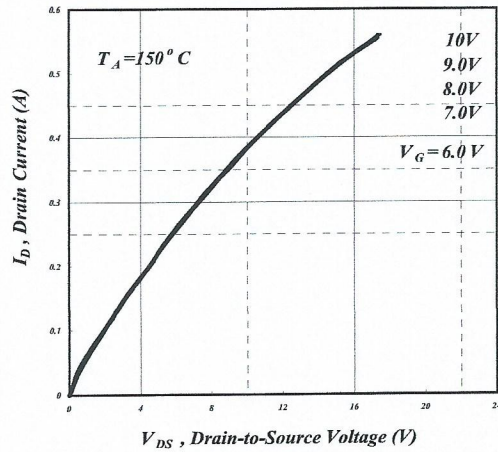


Fig 2. Typical Output Characteristics

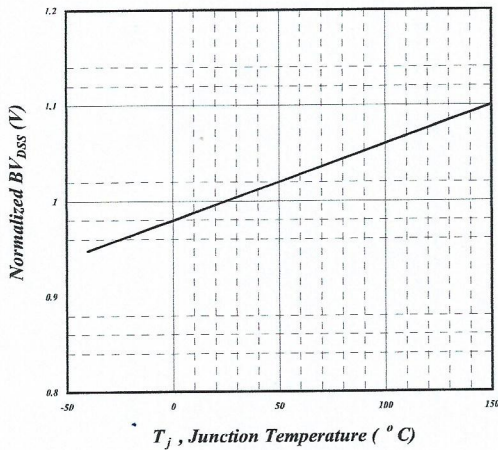


Fig 3. Normalised BVDSS vs. Junction Temperature

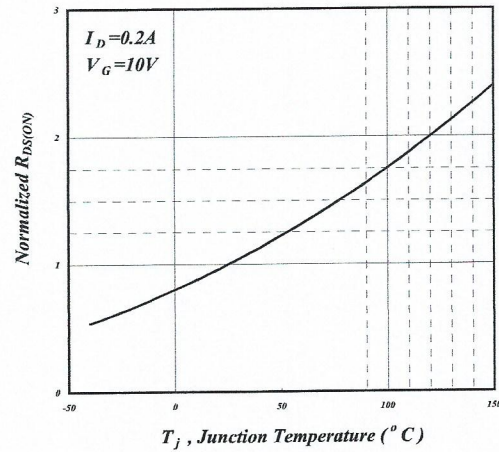


Fig 4. Normalized On-Resistance vs. Junction Temperature

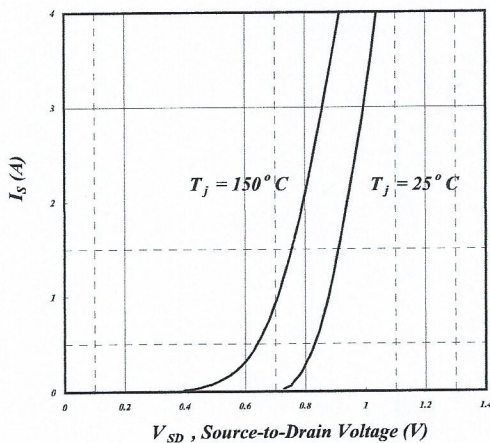


Fig 5. Forward Characteristic of Reverse Diode

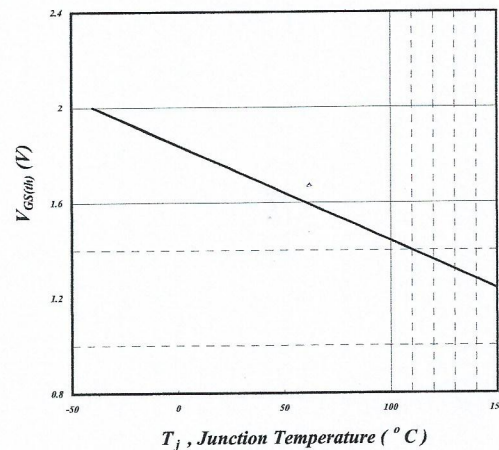


Fig 6. Gate Threshold Voltage vs. Junction Temperature



Typical Electrical Characteristics (cont.)

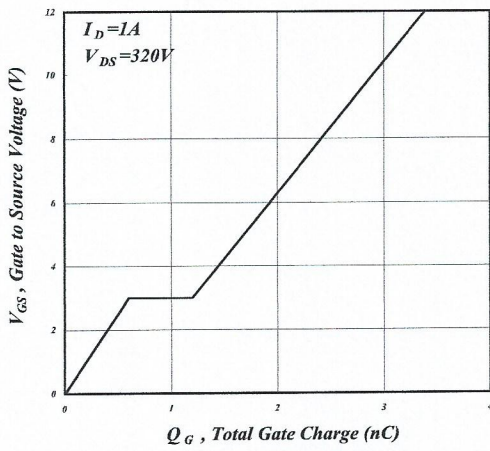


Fig 7. Gate Charge Characteristics

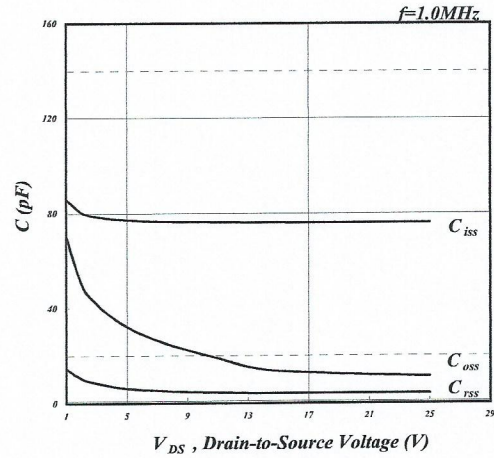


Fig 8. Typical Capacitance Characteristics

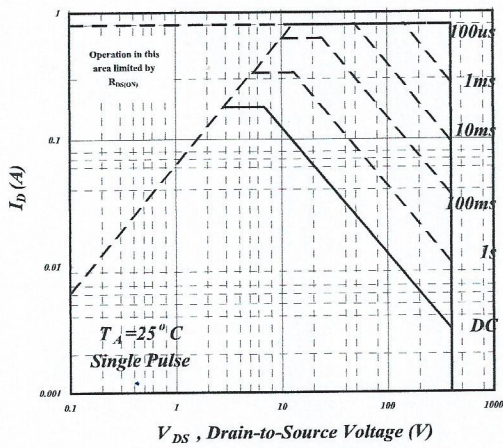


Fig 9. Maximum Safe Operating Area

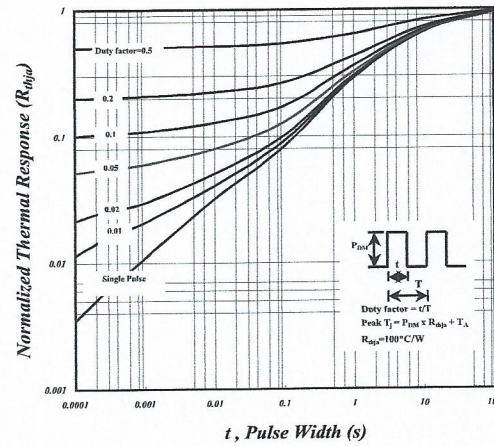


Fig 10. Effective Transient Thermal Impedance

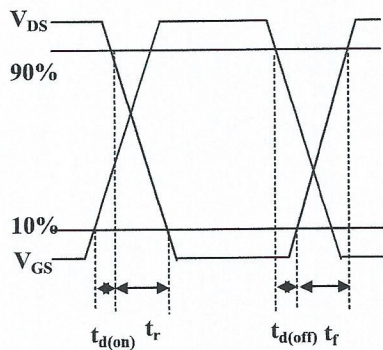


Fig 11. Switching Time Waveform

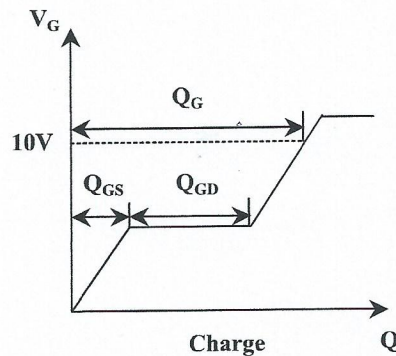
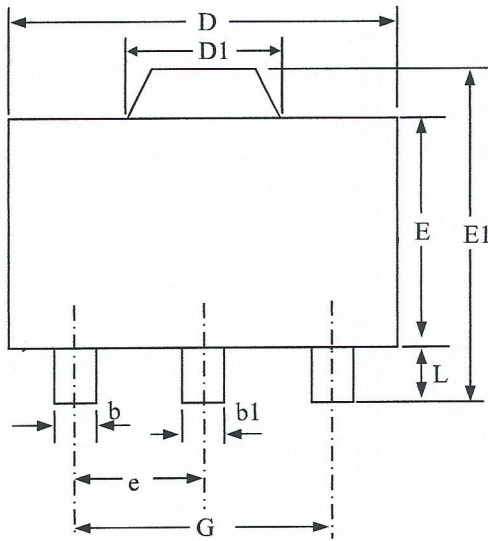


Fig 12. Gate Charge Waveform

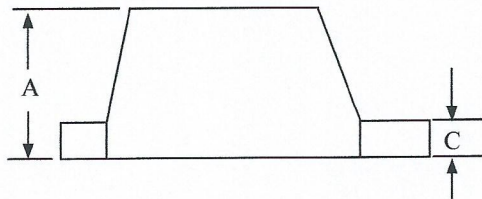


Package Dimensions: SOT-89

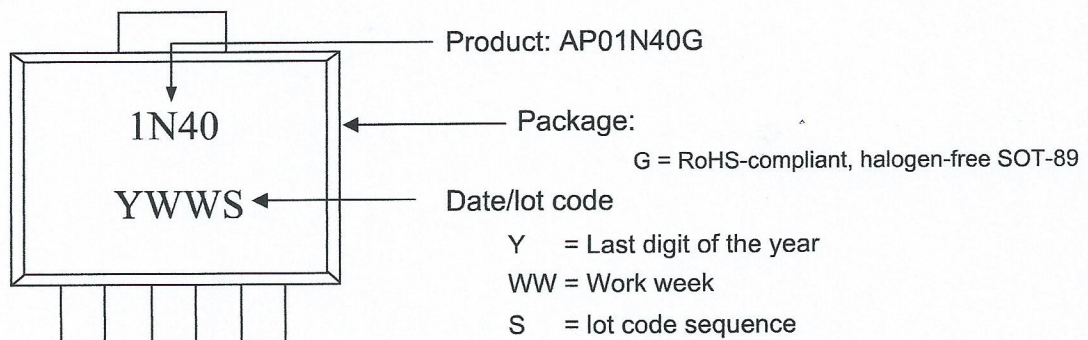


SYMBOLS	Millimeters		
	MIN	NOM	MAX
b	0.32	0.42	0.52
b1	0.40	0.50	0.60
D1	1.40	1.60	1.80
D	4.40	4.50	4.60
E	2.30	2.45	2.60
E1	3.80	4.05	4.30
e	1.30	1.50	1.70
G	2.80	3.00	3.20
A	1.40	1.50	1.60
C	0.34	0.39	0.44
L	0.80	1.00	1.20

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



Marking Information:



Packing: Parts are shipped on tape and reel, 1000pcs per reel. The reel is sealed in a moisture barrier bag (MBB). Once the bag is opened, the parts should be considered moisture-sensitive, as defined in IPC/JEDEC standard, J-STD-020C, with MSL=3, and handled accordingly.