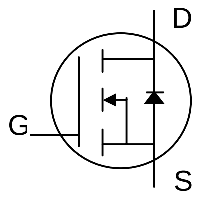
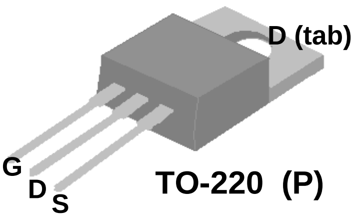
N-channel Enhancement-mode Power MOSFET

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



BV_{DSS}	500V
$R_{DS(ON)}$	1.4Ω
I_D	5.0A

Description



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

The AP05N50P-HF-3 provides high blocking voltage to overcome voltage surge and sag in the toughest power systems with the best combination of fast switching and ruggedized design.

The TO-220 through-hole package is widely used in commercial and industrial applications where a small pcb footprint or an attached heatsink are required.

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	500	V
V_{GS}	Gate-Source Voltage	±20	V
I_D at T_C=25°C	Continuous Drain Current[3]	5.0	A
I_D at T_C=100°C	Continuous Drain Current[3]	2.8	A
I_{DM}	Pulsed Drain Current[1]	18	A
P_D at T_C=25°C	Total Power Dissipation	73.5	W
	Linear Derating Factor	0.59	W/°C
E_{AS}	Single Pulse Avalanche Energy[2]	45	mJ
I_{AR}	Avalanche Current	3	A
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c	Maximum Thermal Resistance, Junction-case	1.7	°C/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient	62	°C/W

Ordering Information

AP05N50P-HF-3TB : in RoHS-compliant halogen-free TO-220, shipped in tubes, (50 pcs/tube)

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=1mA	500	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=2.7A	-	-	1.4	Ω
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	2	-	4	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=2.7A	-	2.4	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=500V, V_{GS}=0V	-	-	25	uA
	Drain-Source Leakage Current (T_j=125°C)	V_{DS}=400V, V_{GS}=0V	-	-	250	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±20V	-	-	±100	nA
Q_g	Total Gate Charge[3]	I_D=3.1A	-	19	30	nC
Q_{gs}	Gate-Source Charge	V_{DS}=400V	-	4.6	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=10V	-	6.3	-	nC
$t_{d(on)}$	Turn-on Delay Time[3]	V_{DD}=250V	-	11	-	ns
t_r	Rise Time	I_D=3.1A	-	8	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=12Ω, V_{GS}=10V	-	32	-	ns
t_f	Fall Time	R_D=80.6Ω	-	10	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	985	1580	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	85	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	3.3	-	pF
R_g	Gate Resistance	f=1.0MHz	-	2.5	3.8	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[3]	I_S=4.5A, V_{GS}=0V	-	-	1.5	V
t_{rr}	Reverse Recovery Time[3]	I_S=3.1A, V_{GS}=0V	-	300	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/µs	-	2.6	-	uC

Notes:

1.Pulse width limited by maximum junction temperature.

2.Starting T_j=25°C , V_{DD}=50V , L=10mH , R_G=25Ω , I_{AS}=3A.

3.Pulse width $\leq$300us , duty cycle $\leq$2%.

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

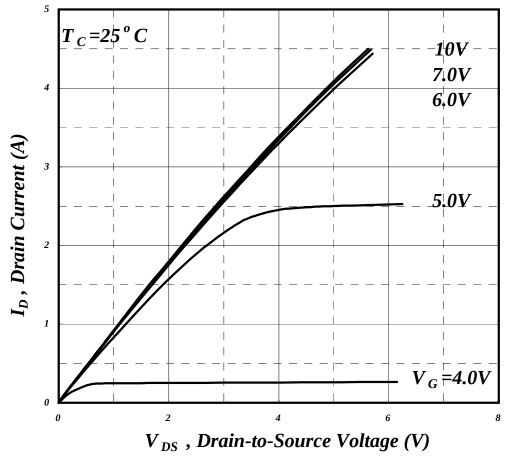


Fig 1. Typical Output Characteristics

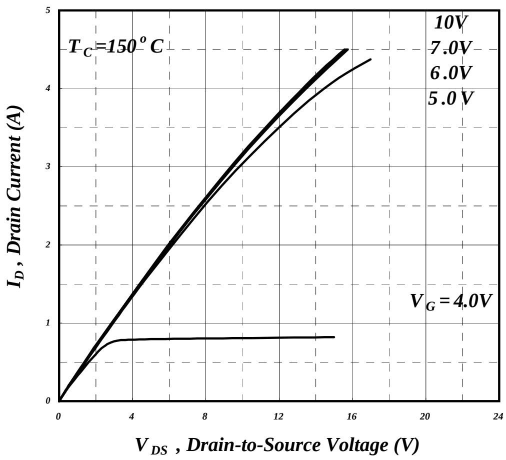


Fig 2. Typical Output Characteristics

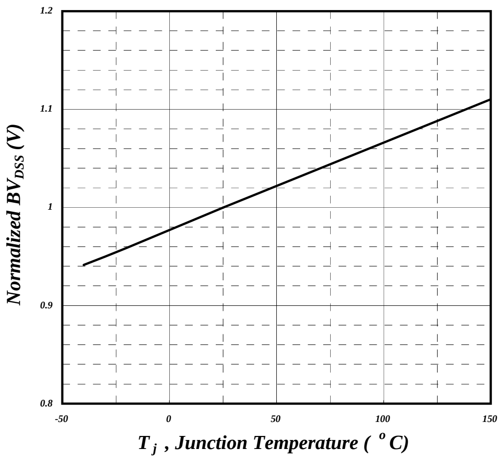


Fig 3. Normalized BV_{DSS} vs. Junction Temperature

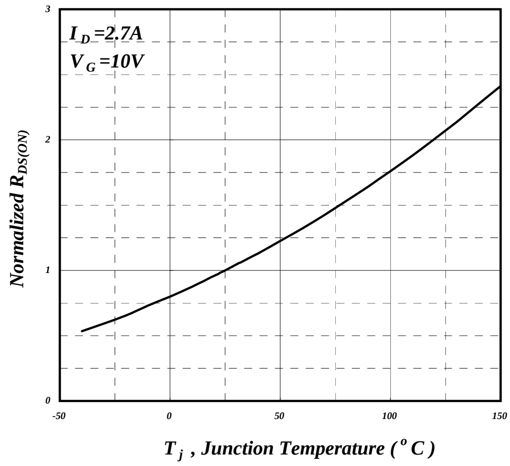


Fig 4. Normalized On-Resistance vs. Junction Temperature

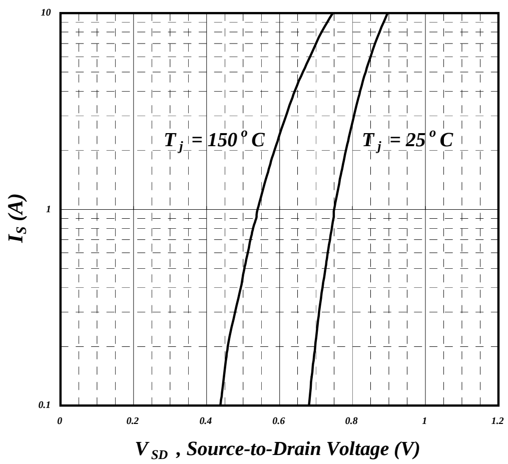


Fig 5. Forward Characteristic of Reverse Diode

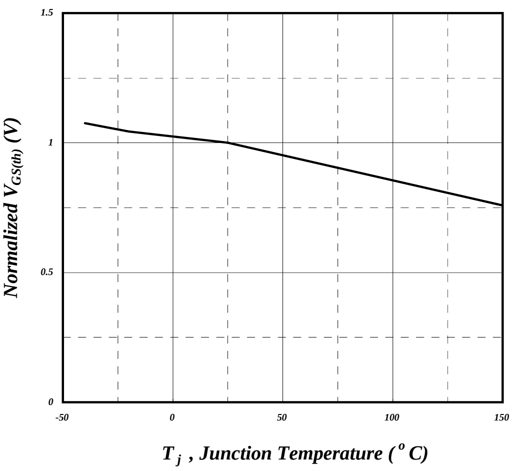


Fig 6. Gate Threshold Voltage vs. Junction Temperature

Typical Electrical Characteristics (cont.)

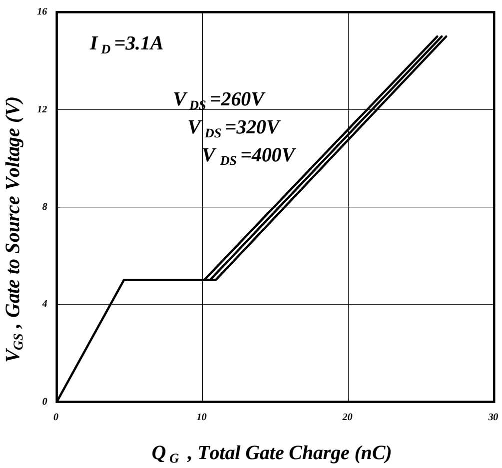


Fig 7. Gate Charge Characteristics

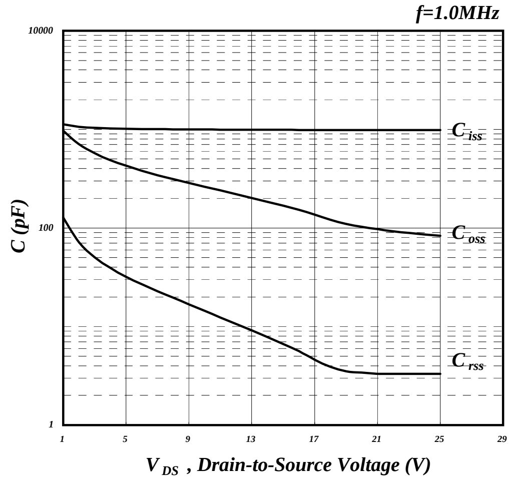


Fig 8. Typical Capacitance Characteristics

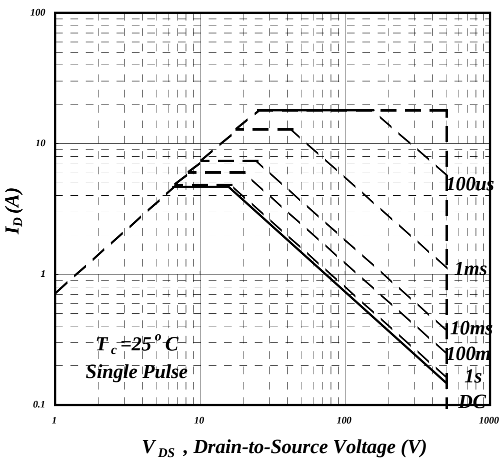


Fig 9. Maximum Safe Operating Area

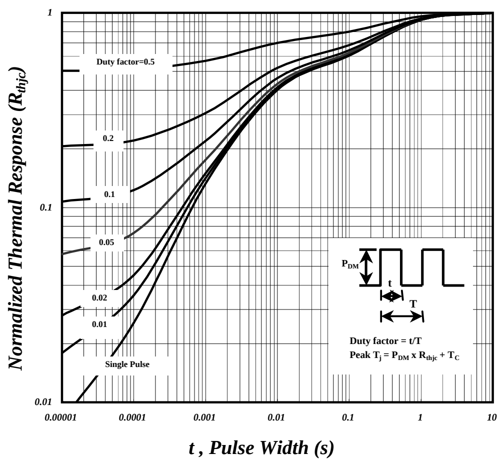


Fig 10. Effective Transient Thermal Impedance

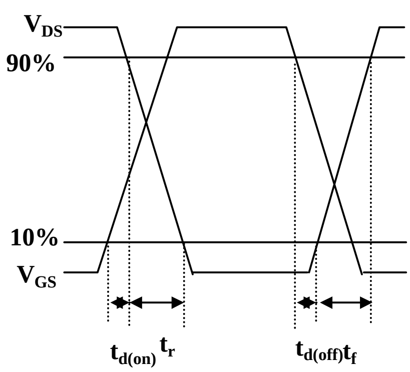


Fig 11. Switching Time Waveforms

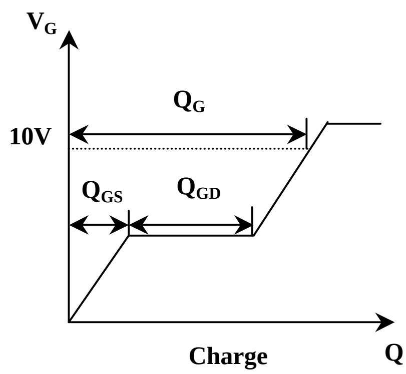
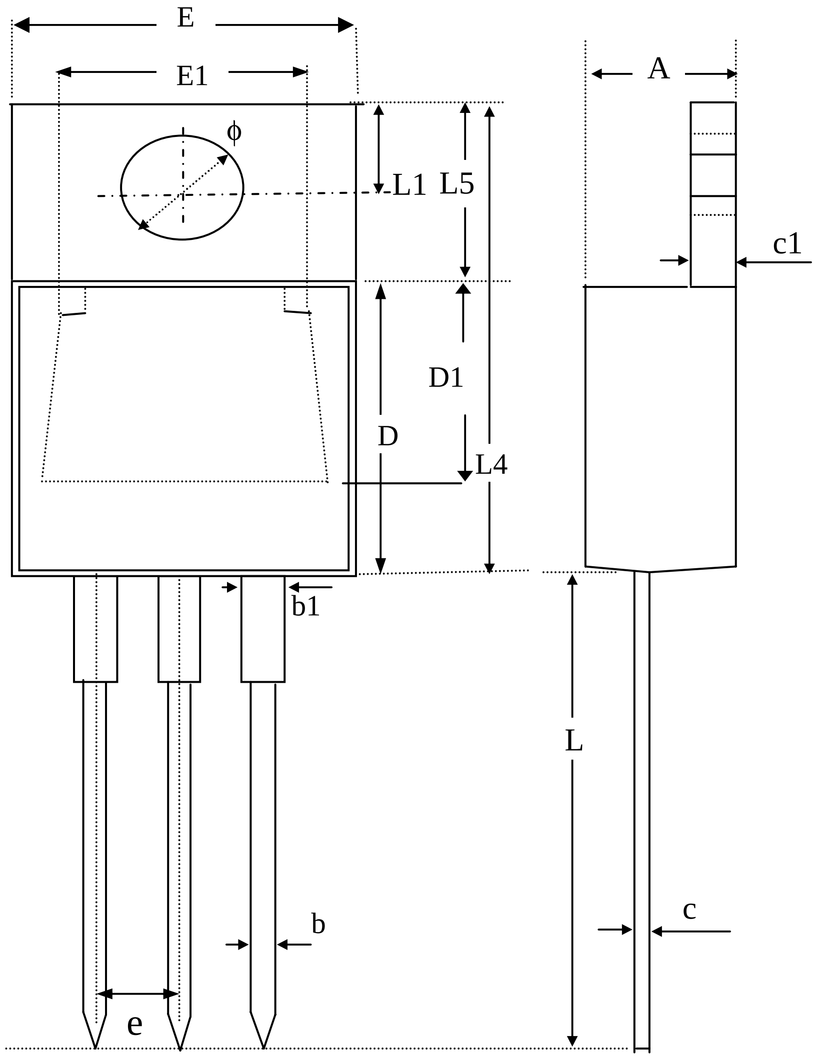


Fig 12. Gate Charge Waveform

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
ϕ	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