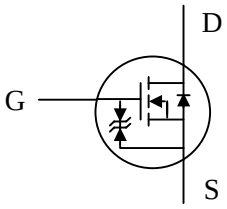
N-channel Enhancement-mode Power MOSFET

Simple Drive Requirement

Repetitive Avalanche Rated

Fast Switching Speed

RoHS-compliant, halogen-free

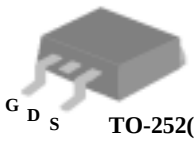


BV_{DSS}	500V
$R_{DS(ON)}$	1.6Ω
I_D	5A

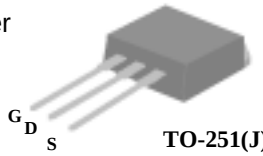
Description

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

The AP05N50EH-HF-3 is in the TO-252 package which is widely preferred for commercial and industrial surface mount applications such as medium-power DC/DC converters. The through-hole TO-251 version (AP05N50EJ-HF-3) is available where a small PCB footprint is required.



TO-252(H)



TO-251(J)

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	500	V
V_{GS}	Gate-Source Voltage	±30	V
I_D at T_C=25°C	Continuous Drain Current	5	A
I_{DM}	Pulsed Drain Current[1]	20	A
P_D at T_C=25°C	Total Power Dissipation	73.5	W
P_D at T_A=25°C	Total Power Dissipation[4]	2	W
E_{AS}	Single Pulse Avalanche Energy[2]	12.5	mJ
I_{AR}	Avalanche Current	5	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 (PCB mount)[4]	62.5	°C/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient	110	°C/W

Ordering Information

AP05N50EH-HF-3TR	**RoHS-compliant TO-252 shipped on tape and reel (3000 pcs/reel)**
AP05N50EJ-HF-3TB	**RoHS-compliant TO-251 shipped in tubes**

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	500	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=2A	-	-	1.6	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=2A	-	3.5	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=400V, V_{GS}=0V	-	-	25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±25V, V_{DS}=0V	-	-	±10	uA
Q_g	Total Gate Charge[3]	I_D=1A	-	20	32	nC
Q_{gs}	Gate-Source Charge	V_{DS}=400V	-	4	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=10V	-	8	-	nC
$t_{d(on)}$	Turn-on Delay Time[3]	V_{DD}=250V	-	10	-	ns
t_r	Rise Time	I_D=1A	-	4	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω	-	27	-	ns
t_f	Fall Time	V_{GS}=10V	-	18	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	775	1240	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	75	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	10	-	pF
R_g	Gate Resistance	f=1.0MHz	-	3.5	-	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[3]	I_S=2A, V_{GS}=0V	-	-	1.5	V
t_{rr}	Reverse Recovery Time[3]	I_S=2A, V_{GS}=0V,	-	250	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	1.75	-	uC

Notes:

1.Pulse width limited by safe operating area

2.Starting T_j=25°C , V_{DD}=50V , L=1mH , R_G=25Ω , I_{AS}=5A.

3.Pulse width ≤300us , duty cycle ≤2%.

4.Surface mounted on 1 in^2 copper pad of FR4 board

Typical Electrical Characteristics

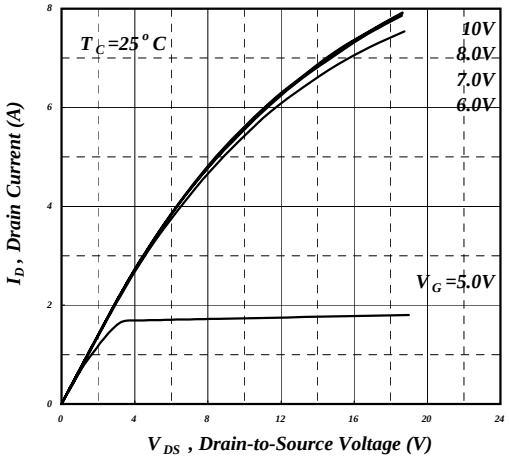


Fig 1. Typical Output Characteristics

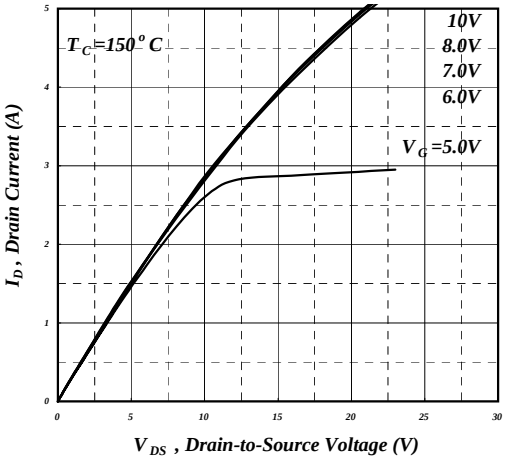


Fig 2. Typical Output Characteristics

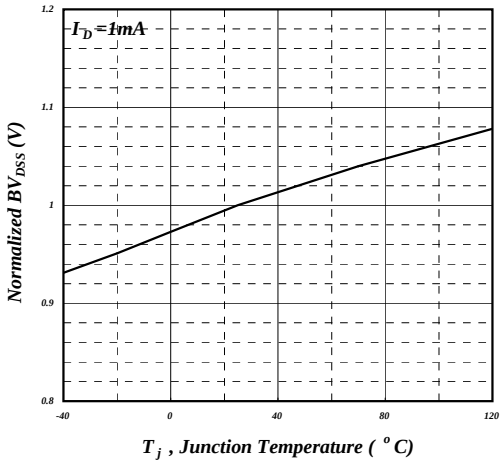


Fig 3. Normalized BV_{DSS} vs. Junction Temperature

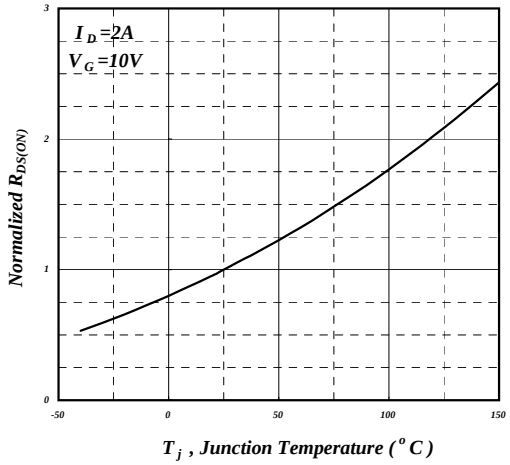


Fig 4. Normalized On-Resistance vs. Junction Temperature

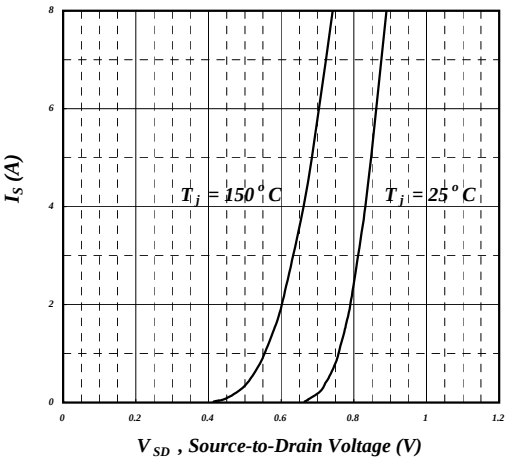


Fig 5. Forward Characteristic of Reverse Diode

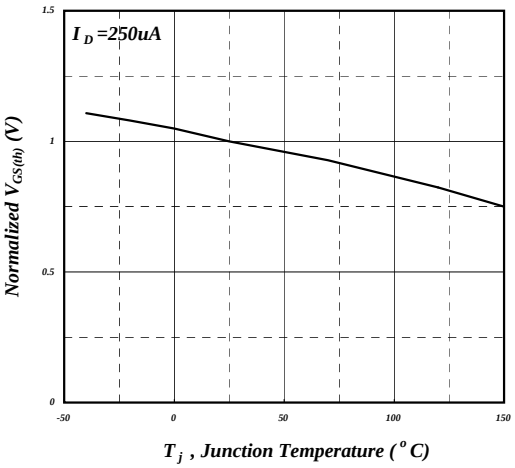


Fig 6. Gate Threshold Voltage vs. Junction Temperature

Typical Electrical Characteristics (cont.)

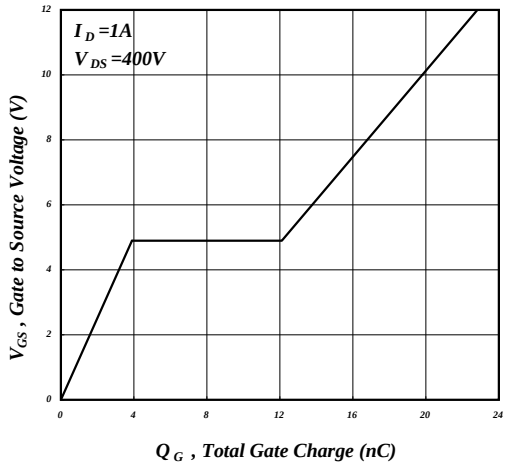


Fig 7. Gate Charge Characteristics

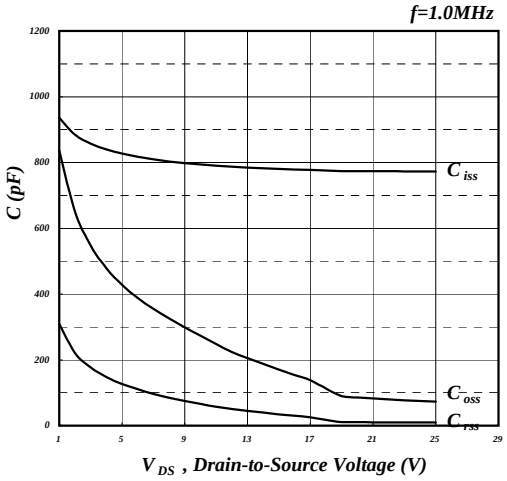


Fig 8. Typical Capacitance Characteristics

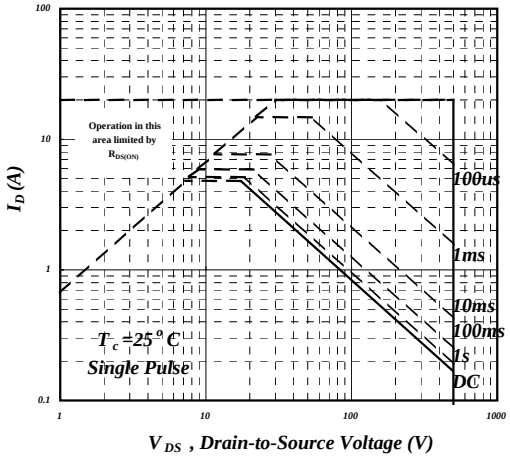


Fig 9. Maximum Safe Operating Area

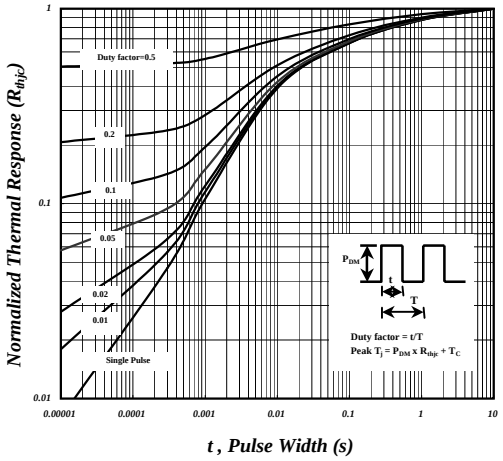


Fig 10. Effective Transient Thermal Impedance

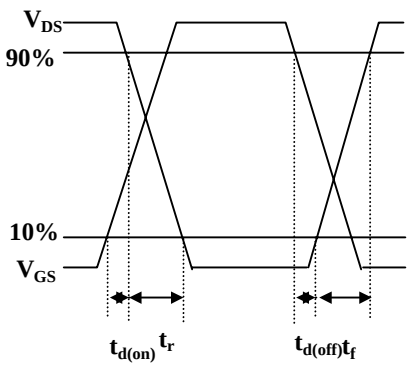


Fig 11. Switching Time Waveforms

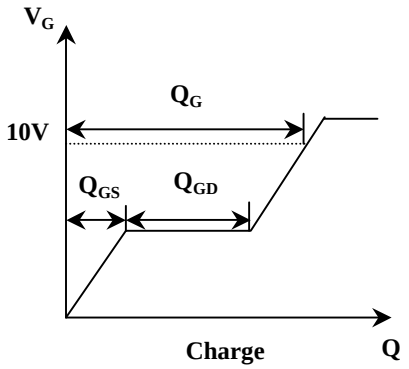
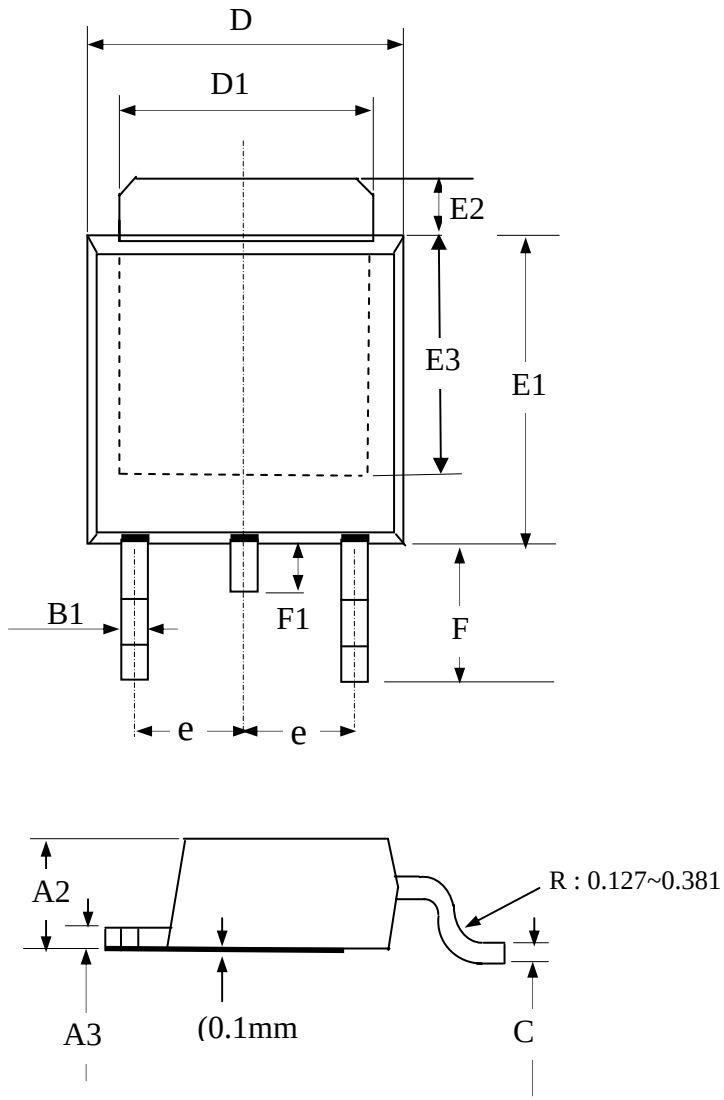


Fig 12. Gate Charge Waveform

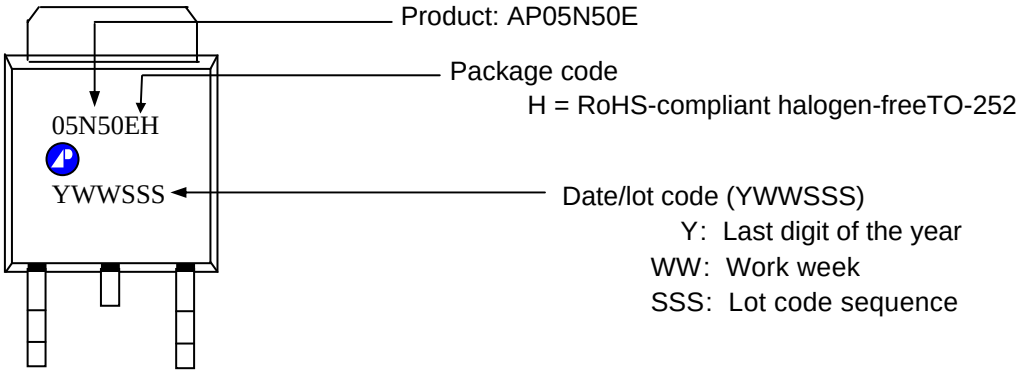
Package Dimensions: TO-252



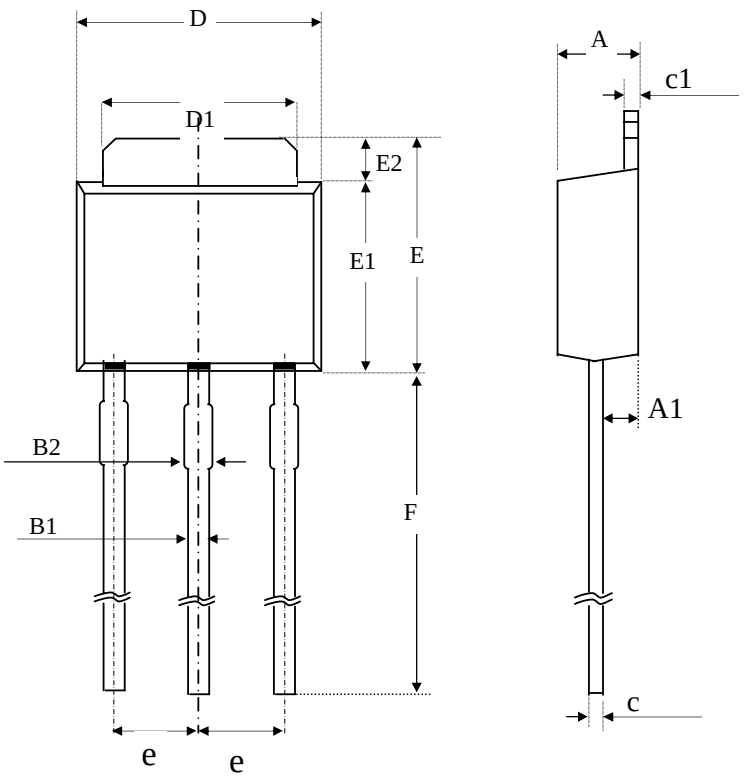
SYMBOLS	Millimeters		
	MIN	NOM	MAX
A2	1.80	2.30	2.80
A3	0.40	0.50	0.60
B1	0.40	0.70	1.00
D	6.00	6.50	7.00
D1	4.80	5.35	5.90
E3	3.50	4.00	4.50
F	2.20	2.63	3.05
F1	0.50	0.85	1.20
E1	5.10	5.70	6.30
E2	0.50	1.10	1.80
e	--	2.30	--
C	0.35	0.50	0.65

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

Marking Information: TO-252



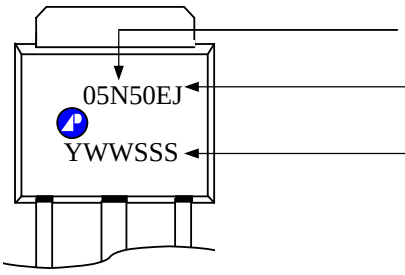
Package Dimensions: TO-251



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.90	1.20	1.50
B1	0.40	0.60	0.80
B2	0.60	0.85	1.05
c	0.40	0.50	0.60
c1	0.40	0.50	0.60
D	6.40	6.60	6.80
D1	4.80	5.20	5.50
E	6.70	7.00	7.30
E1	5.40	5.60	5.80
E2	1.30	1.50	1.70
e	----	2.30	----
F	7.00	8.30	9.60

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

Marking Information: TO-251



Product: AP05N50E

Package Code

J = RoHS-compliant halogen-free TO-251

Date Code (YWWSSS)

Y : Last digit of the year

WW : Work week

SSS : Lot code sequence