



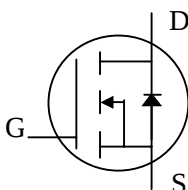
N-channel Enhancement-mode Power MOSFET

Simple Drive Requirement

Low On-resistance

Fast Switching Performance

RoHS-compliant, halogen-free



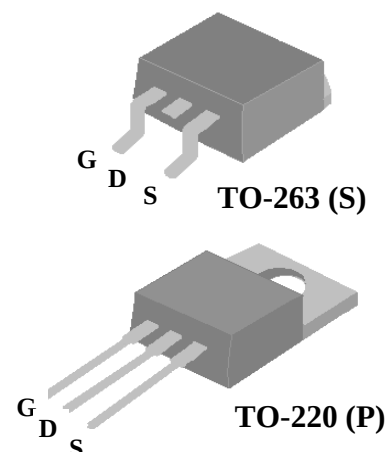
BV_{DSS}	100V
$R_{DS(ON)}$	18m Ω
I_D	67A

Description

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

The AP60T10GS-HF-3 is in the TO-263 package, which is widely used for commercial and industrial surface-mount applications, and is well suited for low voltage applications such as DC/DC converters.

The AP60T10GP-HF-3 is in the TO-220 through-hole package which is used where a low PCB footprint or an attached heatsink is required.



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D at $T_C=25^\circ\text{C}$	Continuous Drain Current	67	A
I_D at $T_C=100^\circ\text{C}$	Continuous Drain Current	42	A
I_{DM}	Pulsed Drain Current ¹	250	A
P_D at $T_C=25^\circ\text{C}$	Total Power Dissipation	167	W
E_{AS}	Single Pulse Avalanche Energy ³	288	mJ
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Value	Units
R_{thj-c}	Maximum Thermal Resistance, Junction-case	0.75	$^\circ\text{C/W}$
R_{thj-a}	Maximum Thermal Resistance, Junction-ambient (PCB mount) ⁴	40	$^\circ\text{C/W}$
R_{thj-a}	Maximum Thermal Resistance, Junction-ambient	62	$^\circ\text{C/W}$

Ordering Information

AP60T10GS-HF-3TR RoHS-compliant halogen-free TO-263, shipped on tape and reel (800 pcs/reel)

AP60T10GP-HF-3TB RoHS-compliant halogen-free TO-220, shipped in tubes



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	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=28A$	-	-	18	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	-	5	V
g_{fs}	Forward Transconductance	$V_{DS}=25V, I_D=28A$	-	45	-	S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=80V, V_{GS}=0V$	-	-	25	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Q_g	Total Gate Charge ²	$I_D=28A$ $V_{DS}=80V$ $V_{GS}=10V$	-	55	90	nC
Q_{gs}	Gate-Source Charge		-	15	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge		-	24	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=50V$ $I_D=28A$ $R_G=2.5\Omega, V_{GS}=10V$ $R_D=1.8\Omega$	-	16	-	ns
t_r	Rise Time		-	68	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	29	-	ns
t_f	Fall Time		-	42	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=25V$ $f=1.0\text{MHz}$	-	2800	4500	pF
C_{oss}	Output Capacitance		-	400	-	pF
C_{rss}	Reverse Transfer Capacitance		-	155	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ²	$I_S=28A, V_{GS}=0V$	-	-	1.3	V
t_{rr}	Reverse Recovery Time ²	$I_S=28A, V_{GS}=0V$ $di/dt=100A/\mu s$	-	80	-	ns
Q_{rr}	Reverse Recovery Charge		-	270	-	nC

Notes:

1. Pulse width limited by maximum junction temperature.
2. Pulse test
3. Starting $T_j=25^{\circ}\text{C}$, $V_{DD}=50V$, $L=1\text{mH}$, $R_G=25\Omega$, $I_{AS}=24A$.
4. Surface mounted on 1 in² copper pad of FR4 board

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

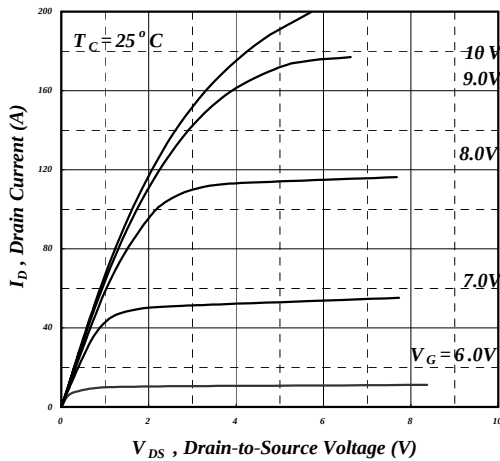


Fig 1. Typical Output Characteristics

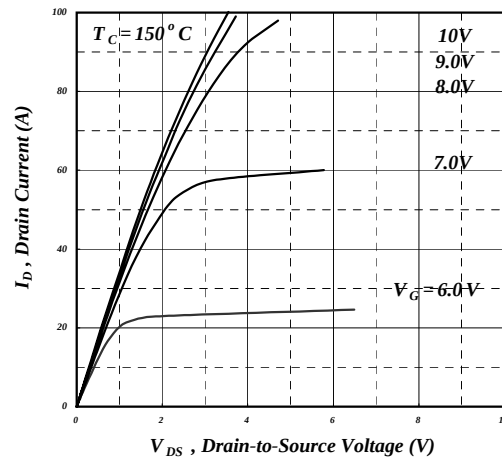


Fig 2. Typical Output Characteristics

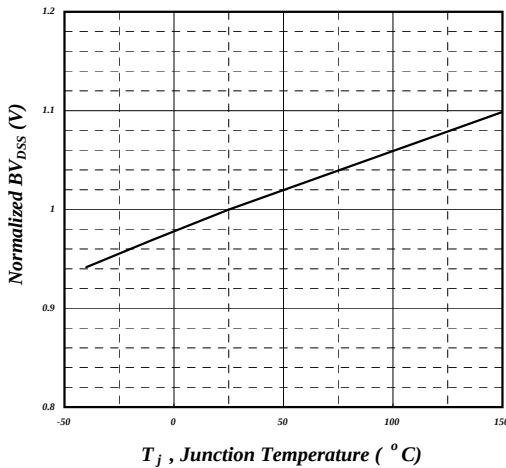


Fig 3. Normalised BVDSS
vs. Junction Temperature

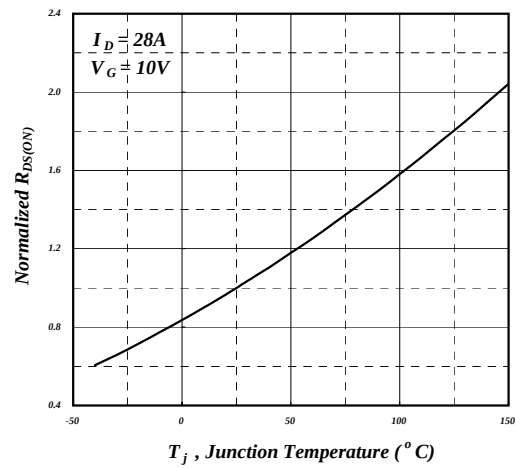


Fig 4. Normalized On-Resistance
vs. Junction Temperature

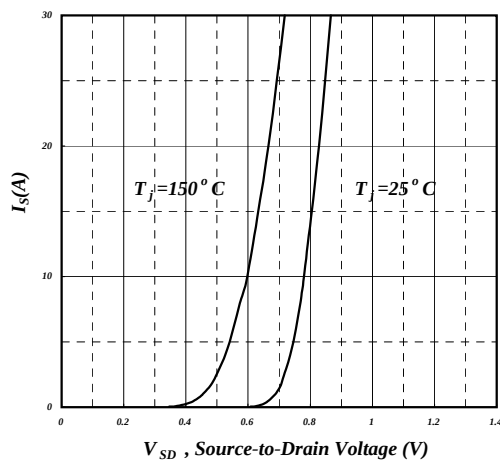


Fig 5. Forward Characteristic of
Reverse Diode

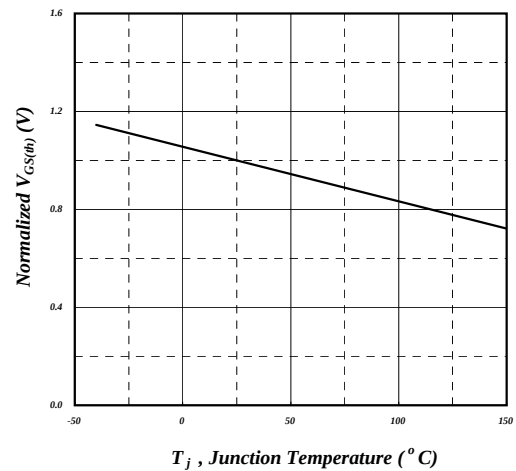


Fig 6. Gate Threshold Voltage vs.
Junction Temperature



Typical Electrical Characteristics (cont.)

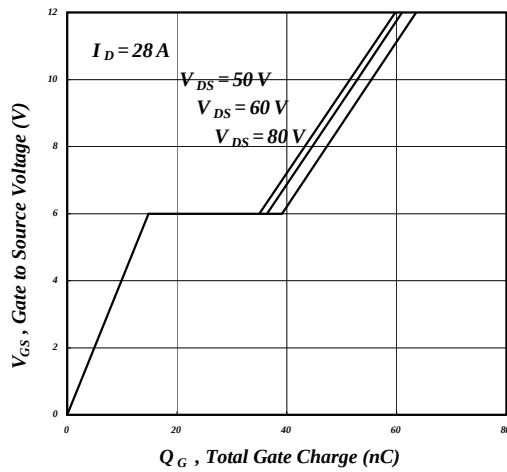


Fig 7. Gate Charge Characteristics

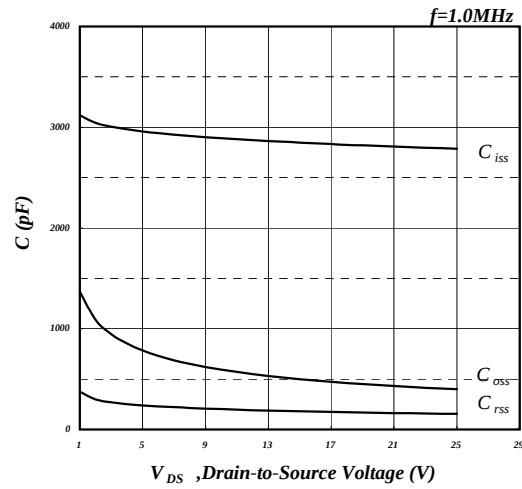


Fig 8. Typical Capacitance Characteristics

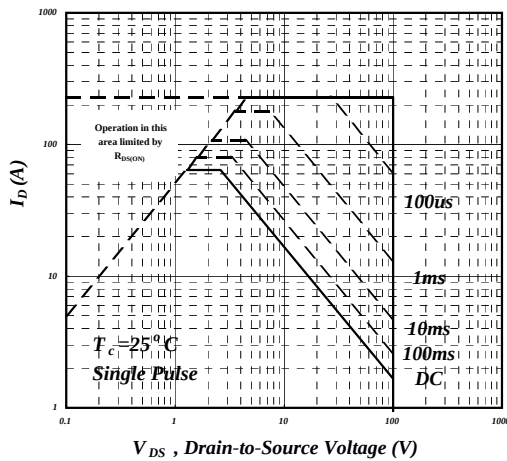


Fig 9. Maximum Safe Operating Area

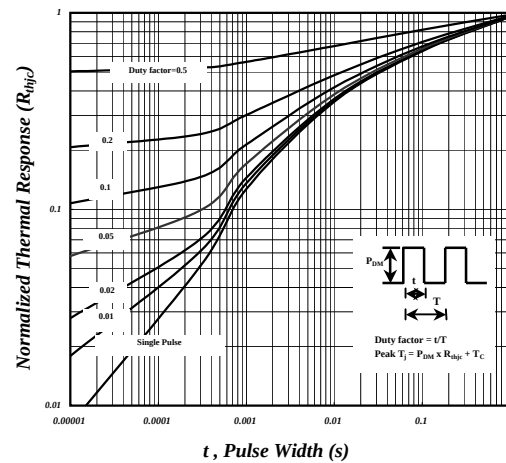


Fig 10. Effective Transient Thermal Impedance

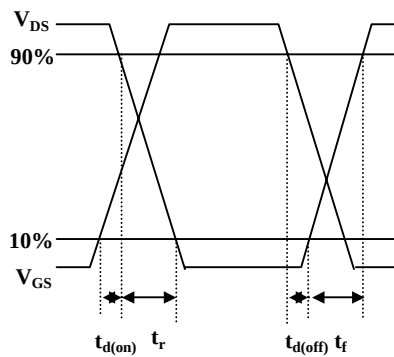


Fig 11. Switching Time Waveforms

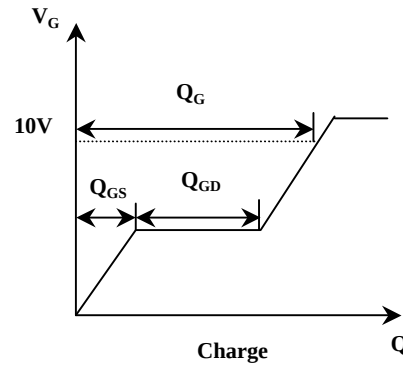
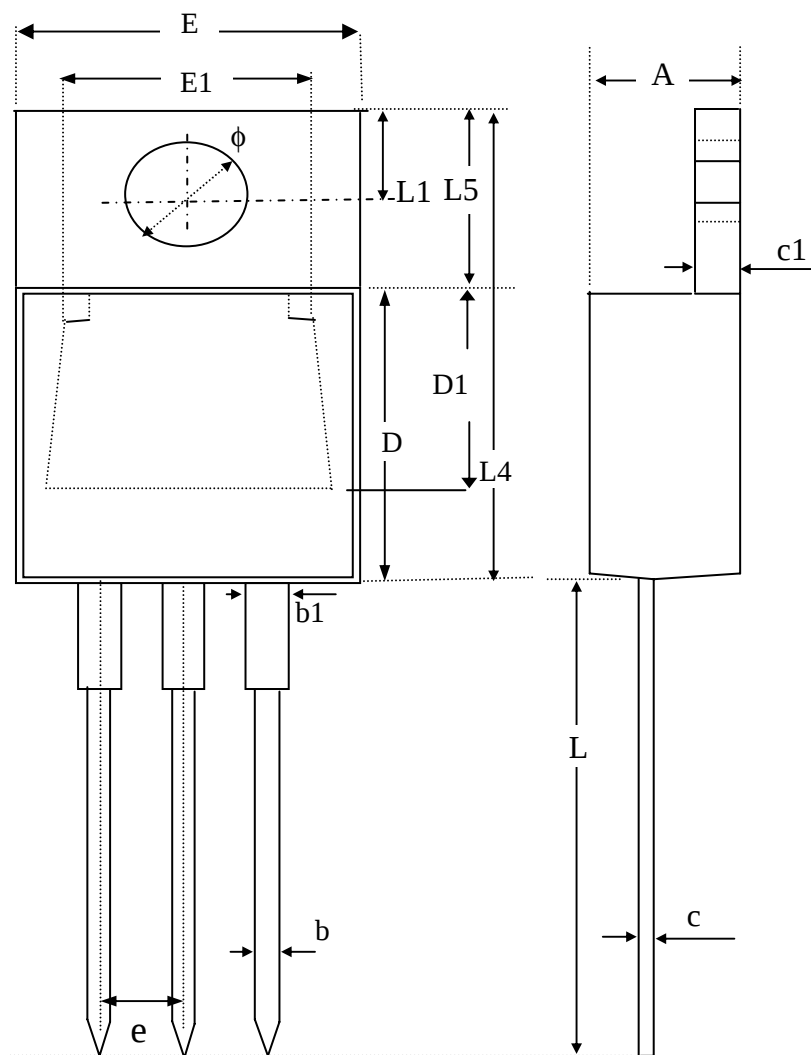


Fig 12. Gate Charge Waveform



Package Dimensions: TO-220

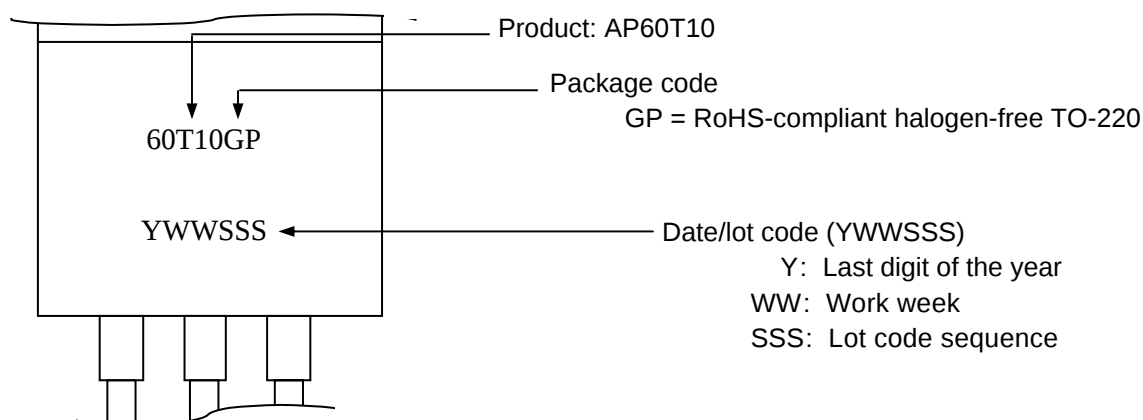


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.40	4.60	4.80
b	0.76	0.88	1.00
D	8.60	8.80	9.00
c	0.36	0.43	0.50
E	9.80	10.10	10.40
L4	14.70	15.00	15.30
L5	6.20	6.40	6.60
D1	5.10 REF.		
c1	1.25	1.35	1.45
b1	1.17	1.32	1.47
L	13.25	13.75	14.25
e	2.54 REF.		
L1	2.60	2.75	2.89
ϕ	3.71	3.84	3.96
E1	7.4 REF.		

1.All Dimensions Are in Millimeters.

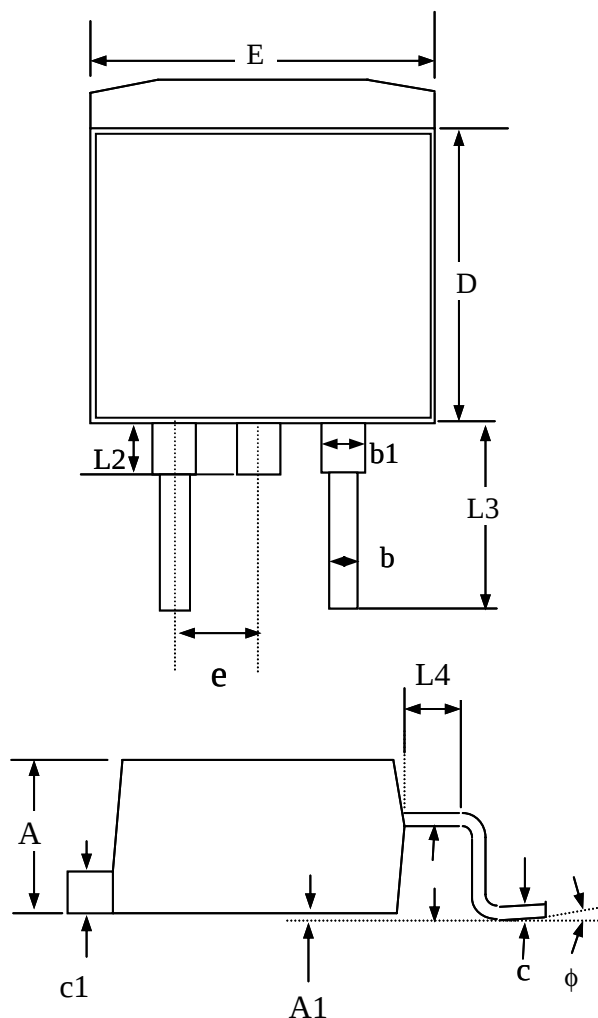
2.Dimension Does Not Include Mold Protrusions.

Marking Information: TO-220





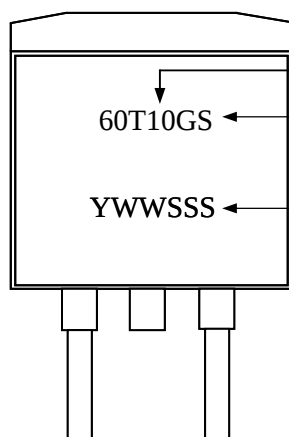
Package Dimensions: TO-263



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.25	4.75	5.20
A1	0.00	0.15	0.30
A2	2.20	2.45	2.70
b	0.70	0.90	1.10
b1	1.07	1.27	1.47
c	0.30	0.45	0.60
c1	1.15	1.30	1.45
D	8.30	8.90	9.40
E	9.70	10.10	10.50
e	2.04	2.54	3.04
L2	-----	1.50	-----
L3	4.50	4.90	5.30
L4	-----	1.50	----

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

Marking Information: TO-263



Product: AP60T10

60T10GS

Package code:

GS = RoHS-compliant halogen-free TO-263

YWWSSS

Date Code (YWWSSS)

Y : Last digit of the year

WW : Work week

SSS : Lot code sequence