



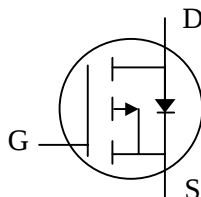
P-channel Enhancement-mode Power MOSFET

2.5V Gate Drive Capability

Simple Drive Requirement

Fast Switching Characteristic

RoHS-compliant



BV_{DSS}	-20V
$R_{DS(ON)}$	52m Ω
I_D	-18A

Description

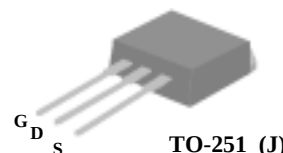
Advanced Power MOSFETs from APEC provide the designer with the best combination of fast switching, low on-resistance and cost-effectiveness.

The AP20P02GH-3 is in the TO-252 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 AP20P02GJ-3 is in the TO-251 through-hole package which is used where a small PCB footprint or an attached heatsink is required.



TO-252 (H)



TO-251 (J)

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D at $T_C=25^\circ\text{C}$	Continuous Drain Current ³	-18	A
I_D at $T_C=100^\circ\text{C}$	Continuous Drain Current ³	-14	A
I_{DM}	Pulsed Drain Current ¹	-50	A
P_D at $T_C=25^\circ\text{C}$	Total Power Dissipation	31.25	W
	Linear Derating Factor	0.25	W/ $^\circ\text{C}$
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	Unit
Rthj-c	Maximum Thermal Resistance, Junction-case	4.0	$^\circ\text{C/W}$
Rthj-a	Maximum Thermal Resistance, Junction-ambient	110	$^\circ\text{C/W}$

Ordering Information

AP20P02GH-3TR RoHS-compliant TO-252, shipped on tape and reel (3000 pcs/reel)

AP20P02GJ-3TB RoHS-compliant TO-251, 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	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
$\Delta BV_{DSS} / \Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C , $I_D=-1\text{mA}$	-	-0.03	-	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-4.5V, I_D=-8A$	-	-	52	$m\Omega$
		$V_{GS}=-2.5V, I_D=-5A$	-	-	85	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5	-	-	V
g_{fs}	Forward Transconductance	$V_{DS}=-10V, I_D=-8A$	-	15	-	S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	μA
	Drain-Source Leakage Current ($T_j=125^\circ\text{C}$)	$V_{DS}=-16V, V_{GS}=0V$	-	-	-25	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 25V, V_{DS}=0V$	-	-	± 100	nA
Q_g	Total Gate Charge ²	$I_D=-8A$	-	13.5	-	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=-16V$	-	2.1	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=-4.5V$	-	1.6	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=-10V$	-	12	-	ns
t_r	Rise Time	$I_D=-8A$	-	20	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=-4.5V$	-	45	-	ns
t_f	Fall Time	$R_D=1.25\Omega$	-	27	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	1050	-	pF
C_{oss}	Output Capacitance	$V_{DS}=-16V$	-	410	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	110	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current (Body Diode)	$V_D=V_G=0V, V_S=-1.2V$	-	-	-10	A
I_{SM}	Pulsed Source Current (Body Diode) ¹		-	-	-50	A
V_{SD}	Forward On Voltage ²	$T_j=25^\circ\text{C}, I_S=-10A, V_{GS}=0V$	-	-	-1.2	V

Notes:

1. Pulse width limited by safe operating area
2. Pulse test - pulse width $\leq 300\mu s$, 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.

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Typical Electrical Characteristics

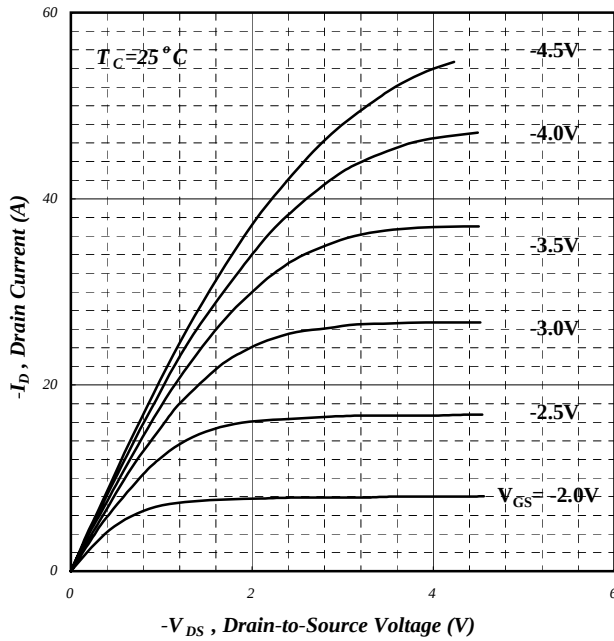


Fig 1. Typical Output Characteristics

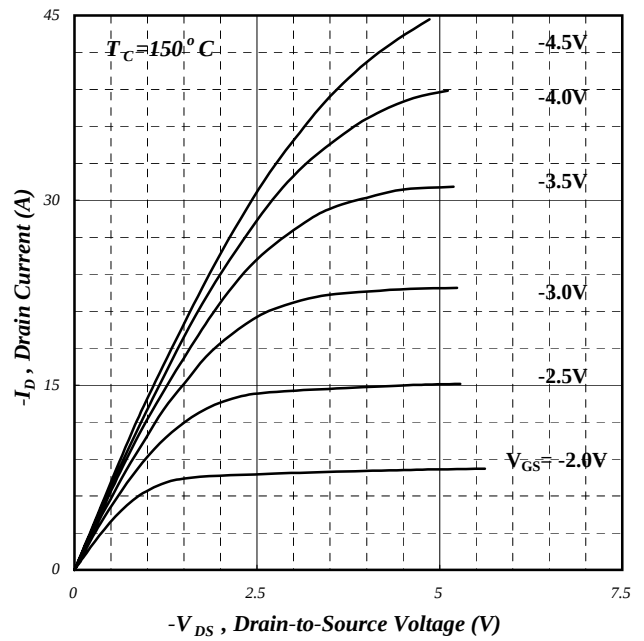


Fig 2. Typical Output Characteristics

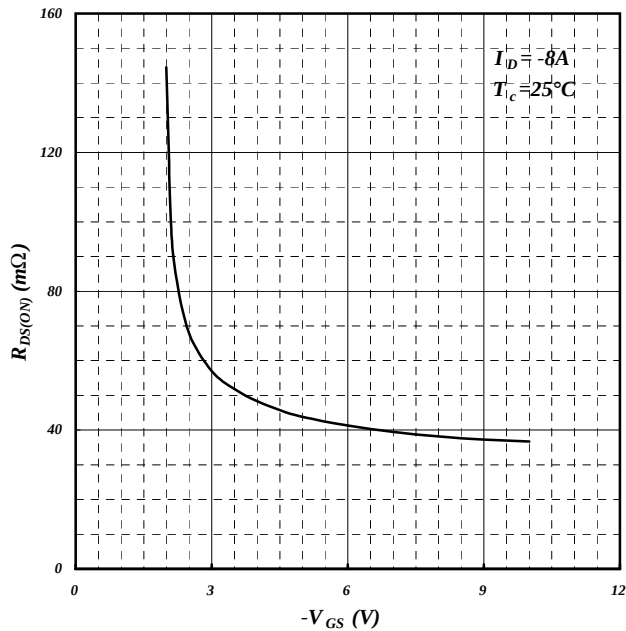


Fig 3. On-Resistance v.s. Gate Voltage

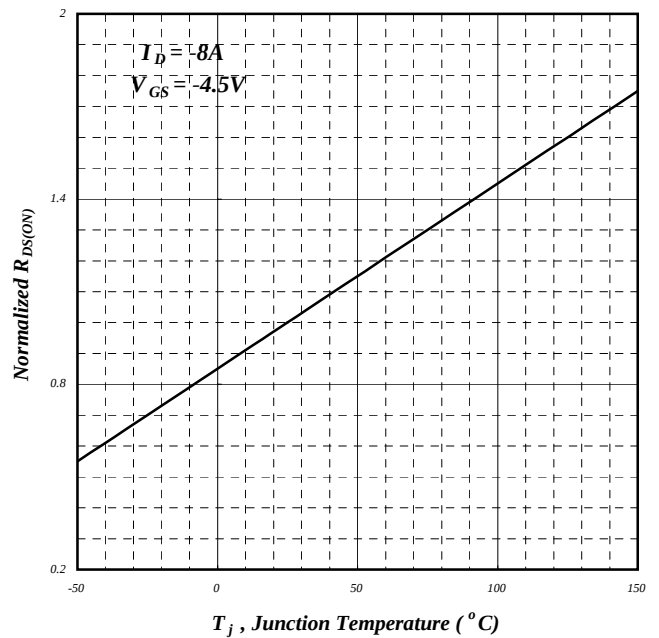


Fig 4. Normalized On-Resistance vs. Junction Temperature



Typical Electrical Characteristics

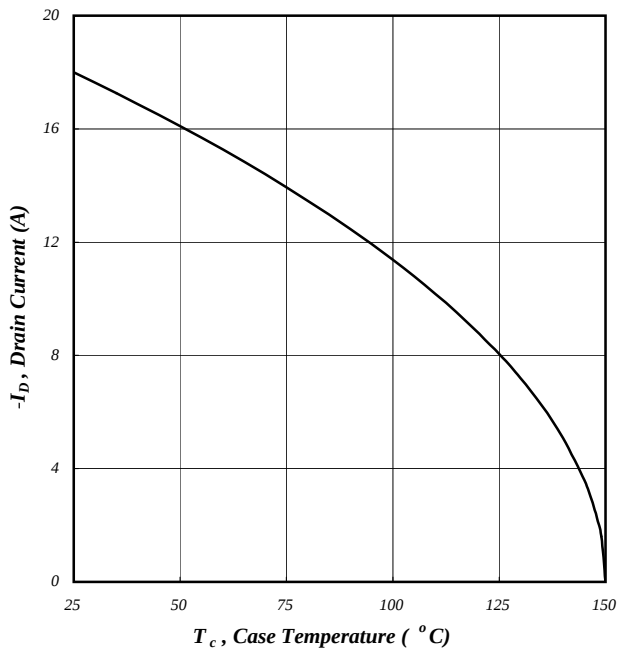


Fig 5. Maximum Drain Current v.s.
Case Temperature

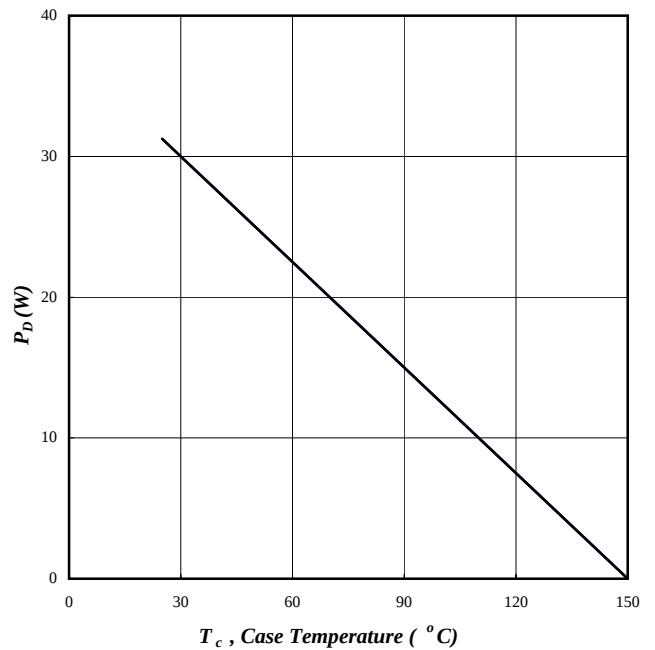


Fig 6. Typical Power Dissipation

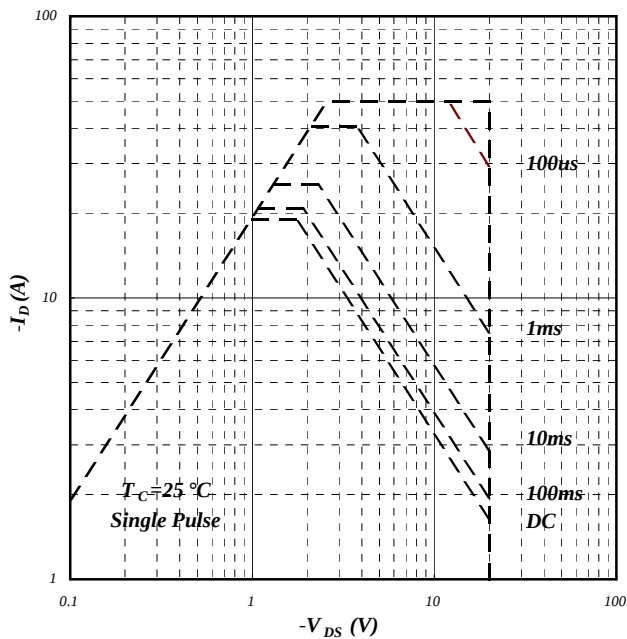


Fig 7. Maximum Safe Operating Area

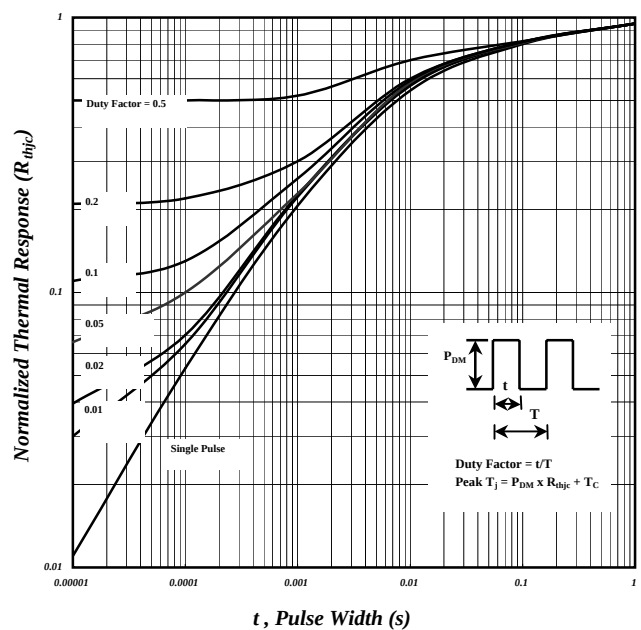


Fig 8. Effective Transient Thermal Impedance



Typical Electrical Characteristics

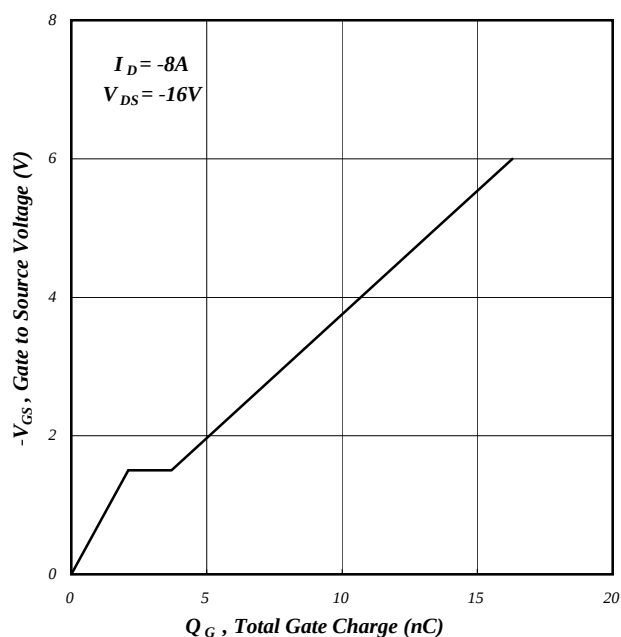


Fig 9. Gate Charge Characteristics

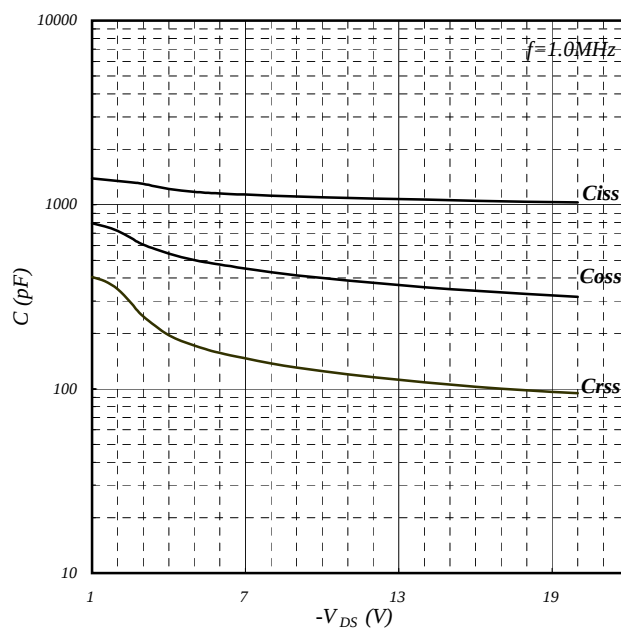


Fig 10. Typical Capacitance Characteristics

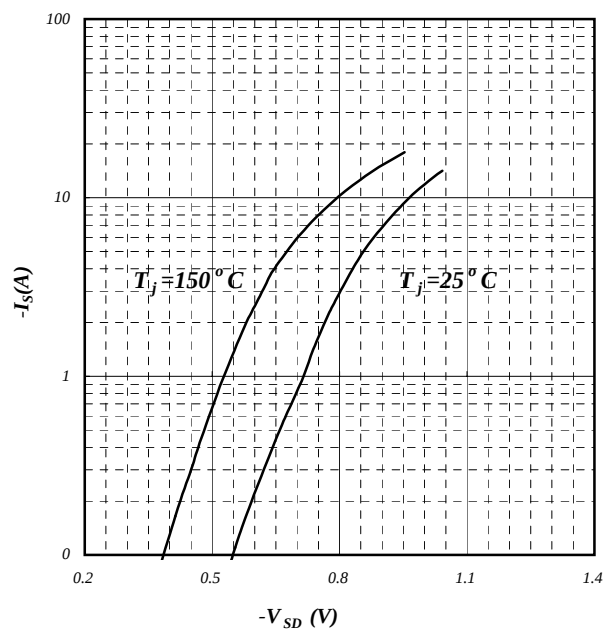


Fig 11. Forward Characteristic of
Reverse Diode

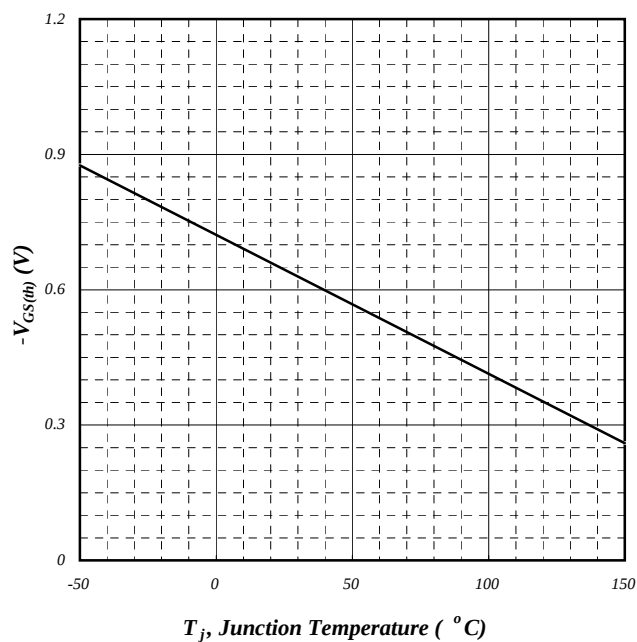


Fig 12. Gate Threshold Voltage v.s.
Junction Temperature



Typical Electrical Characteristics (cont.)

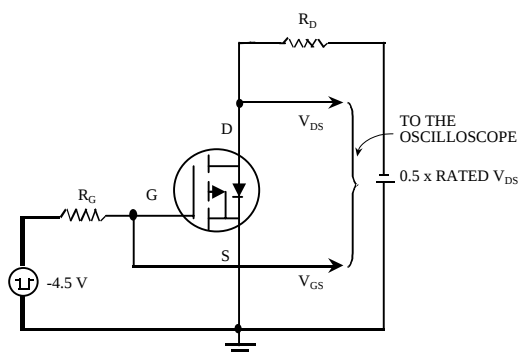


Fig 13. Switching Time Circuit

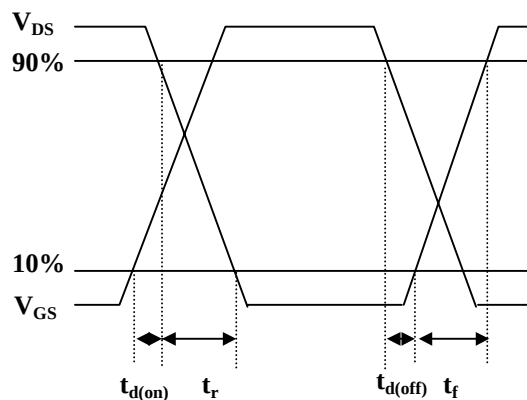


Fig 14. Switching Time Waveform

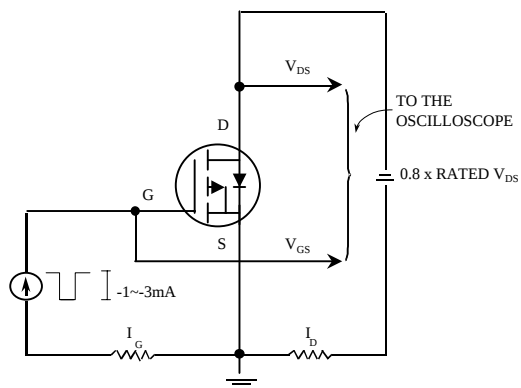


Fig 15. Gate Charge Circuit

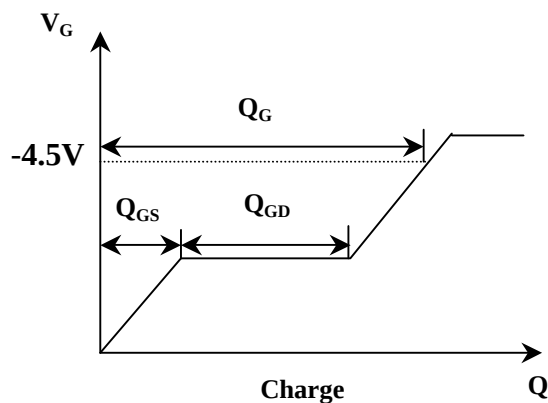
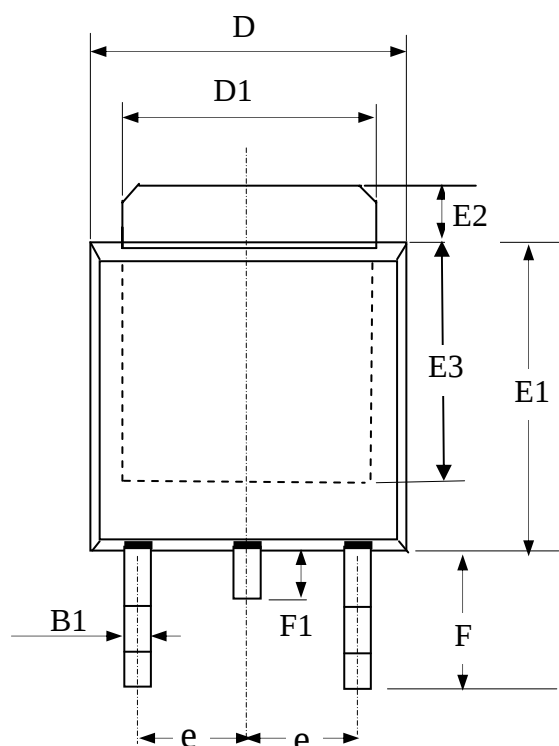


Fig 16. Gate Charge Waveform

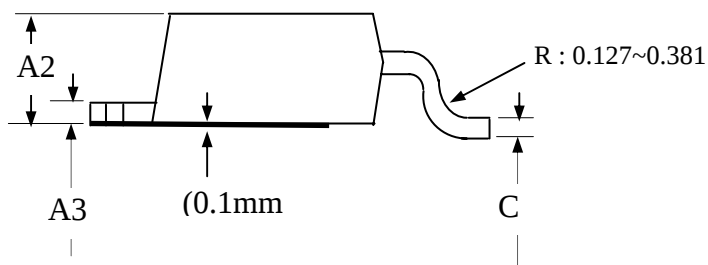


Package Dimensions: TO-252



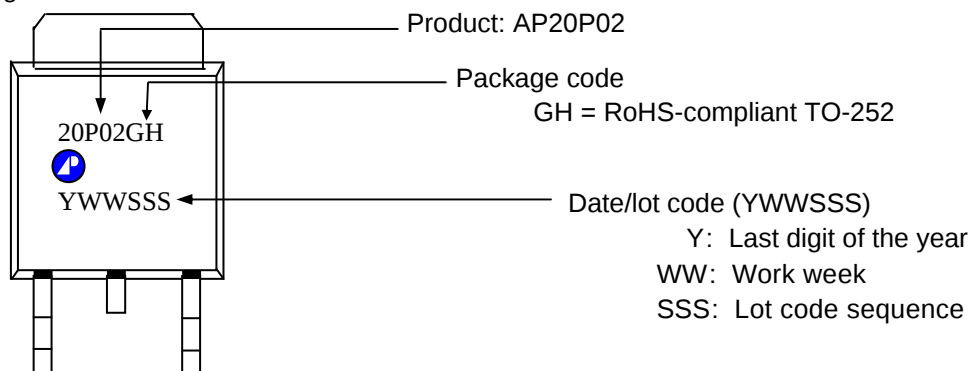
SYMBOLS	Millimeters		
	MIN	NOM	MAX
A2	1.80	2.30	2.80
A3	0.40	0.50	0.60
B1	0.40	0.70	1.00
D	6.00	6.50	7.00
D1	4.80	5.35	5.90
E3	3.50	4.00	4.50
F	2.20	2.63	3.05
F1	0.50	0.85	1.20
E1	5.10	5.70	6.30
E2	0.50	1.10	1.80
e	--	2.30	--
C	0.35	0.50	0.65

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



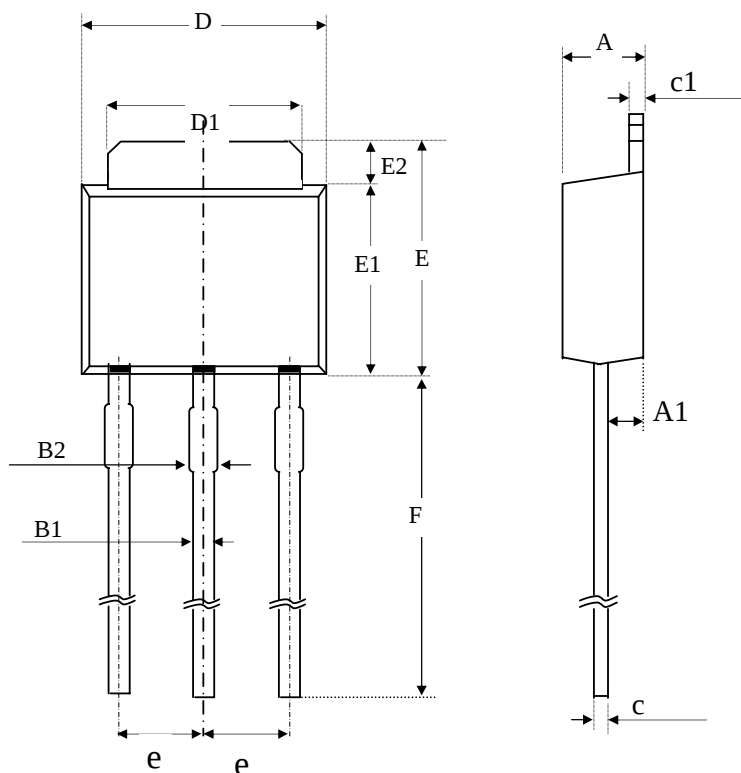
Marking Information

Laser Marking





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

