AP06450K

60V P-Channel MOSFET

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
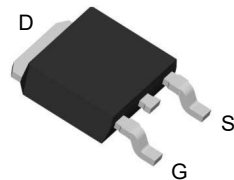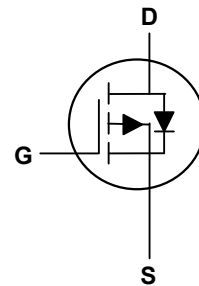- Green Device Available

Product Summary

V_{DS}	-60	V
I_D	-45	A
$R_{DS(ON)}$ (at V_{GS}=-10V)	25	mΩ
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	40	mΩ

RoHS

Applications

- High Frequency Point-of-Load,Synchronous Buck Converter
- Networking DC-DC Power System
- Load Switch

TO-252 Top View

Absolute Maximum Ratings(T_C=25℃, unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current[1]	I_D@T_C=25℃	-45	A
Continuous Drain Current[1]	I_D@T_C=100℃	-28	A
Pulsed Drain Current[2]	I_{DM}	-140	A
Single Pulse Avalanche Energy[3]	EAS	101	mJ
Avalanche Current	I_{AS}	45.5	A
Total Power Dissipation[4]	P_D@T_C=25℃	85	W
Storage Temperature Range	T_{STG}	-55 to 150	℃
Operating Junction Temperature Range	T_J	-55 to 150	℃

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance Junction-Ambient[1]	$R_{θJA}$	---	50	℃/W
Thermal Resistance Junction-Case[1]	$R_{θJC}$	---	1.1	℃/W

Electrical Characteristics (T$_J$=25℃, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV$_{DSS}$	V$_{GS}$=0V , I$_D$=-250uA	-60	---	---	V
BV$_{DSS}$ Temperature Coefficient	△BV$_{DSS}$/△T$_J$	Reference to 25℃ , I$_D$=-1mA	---	-0.035	---	V/℃
Static Drain-Source On-Resistance[2]	R$_{DS(ON)}$	V$_{GS}$=-10V, I$_D$=-20A	---	---	25	mΩ
		V$_{GS}$=-4.5V, I$_D$=-15A	---	---	40	mΩ
Gate Threshold Voltage	V$_{GS(th)}$	V$_{GS}$=V$_{DS}$, I$_D$ =-250uA	-1.0	---	-3.0	V
V$_{GS(th)}$ Temperature Coefficient	△V$_{GS(th)}$		---	4.25	---	mV/℃
Drain-Source Leakage Current	I$_{DSS}$	V$_{DS}$=-48V, V$_{GS}$=0V, T$_J$=25℃	---	---	1	uA
		V$_{DS}$=-48V, V$_{GS}$=0V, T$_J$=55℃	---	---	5	uA
Gate-Source Leakage Current	I$_{GSS}$	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA
Forward Transconductance	gfs	V$_{DS}$=-10V, I$_D$=-20A	---	22	---	S
Gate Resistance	R$_g$	V$_{DS}$=0V , V$_{GS}$=0V , f=1MHz	---	7	---	Ω
Total Gate Charge	Q$_g$	V$_{DS}$=-20V , V$_{GS}$=-10V , I$_D$=-12A	---	56	---	nC
Gate-Source Charge	Q$_{gs}$		---	6.7	---	
Gate-Drain Charge	Q$_{gd}$		---	5.5	---	
Turn-On Delay Time	T$_{d(on)}$	V$_{DD}$=-15V , V$_{GS}$=-10V , R$_G$=3.3Ω, I$_D$=-1A	---	38	---	ns
Rise Time	T$_r$		---	23.6	---	
Turn-Off Delay Time	T$_{d(off)}$		---	100	---	
Fall Time	T$_f$		---	6.8	---	
Input Capacitance	C$_{iss}$	V$_{DS}$=-15V , V$_{GS}$=0V , f=1MHz	---	3635	---	pF
Output Capacitance	C$_{oss}$		---	224	---	
Reverse Transfer Capacitance	C$_{rss}$		---	141	---	

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current[1,5]	I$_S$	V$_G$=V$_D$=0V , Force Current	---	---	-45	A
Pulsed Source Current[2,5]	I$_{SM}$		---	---	-140	A
Diode Forward Voltage[2]	V$_{SD}$	V$_{GS}$=0V , I$_S$=-25A , T$_J$=25℃	---	---	-1.2	V

Note:

1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3. The EAS data shows Max. rating . The test condition is V$_{DD}$=-30V,V$_{GS}$=-10V,L=0.1mH

4. The power dissipation is limited by 150℃ junction temperature
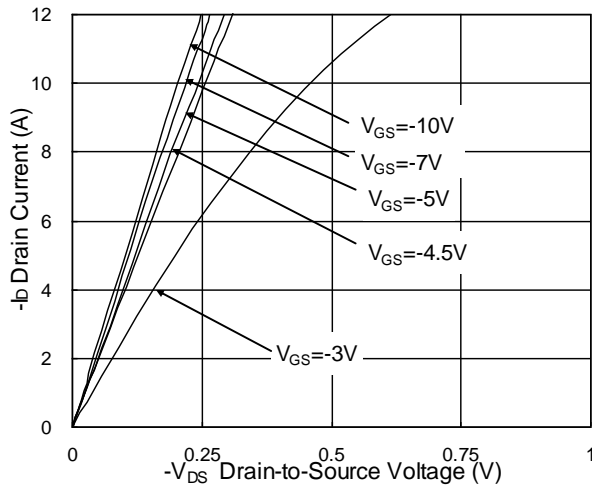
Typical Characteristics
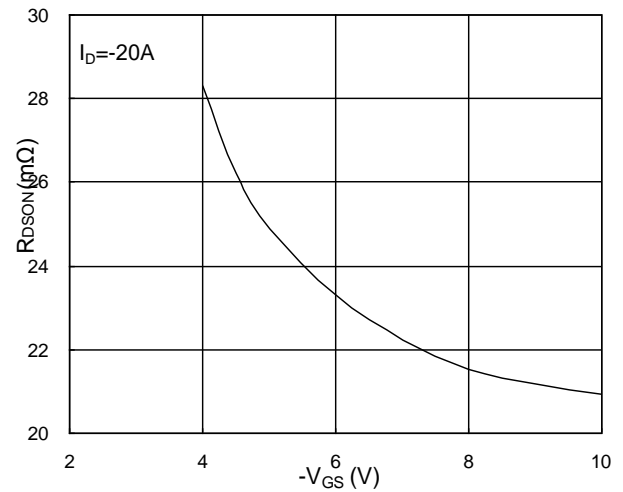

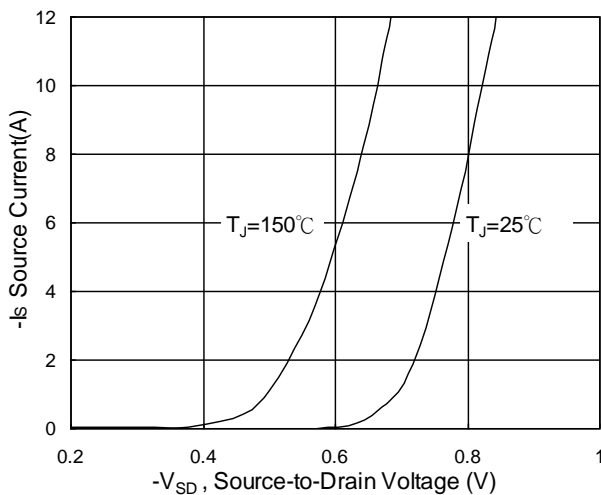**Fig.1 Typical Output Characteristics**

Fig.2 On-Resistance vs. G-S Voltage

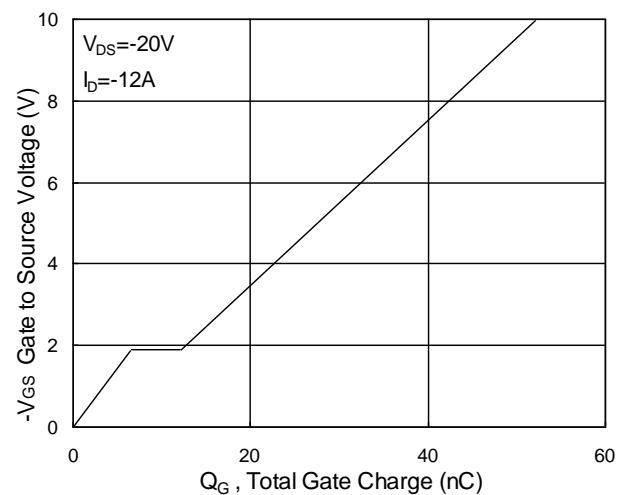**Fig.3 Forward Characteristics of Reverse**

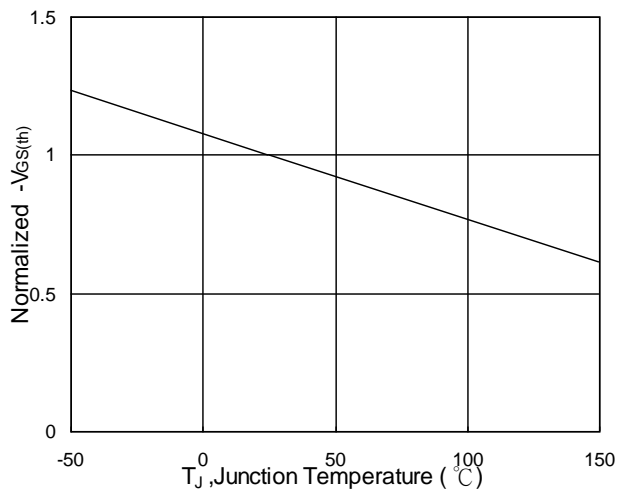**Fig.4 Gate-Charge Characteristics**
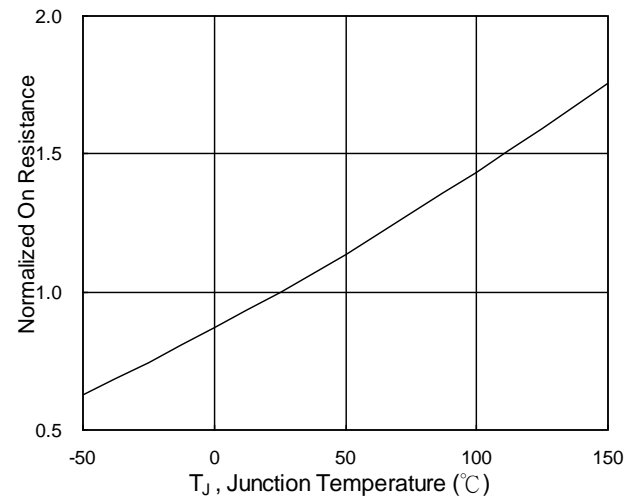

Fig.5 Normalized $V_{GS(th)}$ vs. T_J

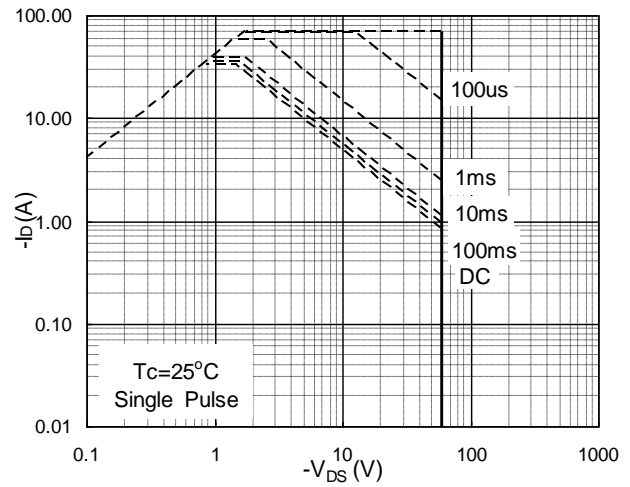**Fig.6 Normalized R_{DSON} vs. T_J**

Fig.7 Capacitance

Fig.8 Safe Operating Area

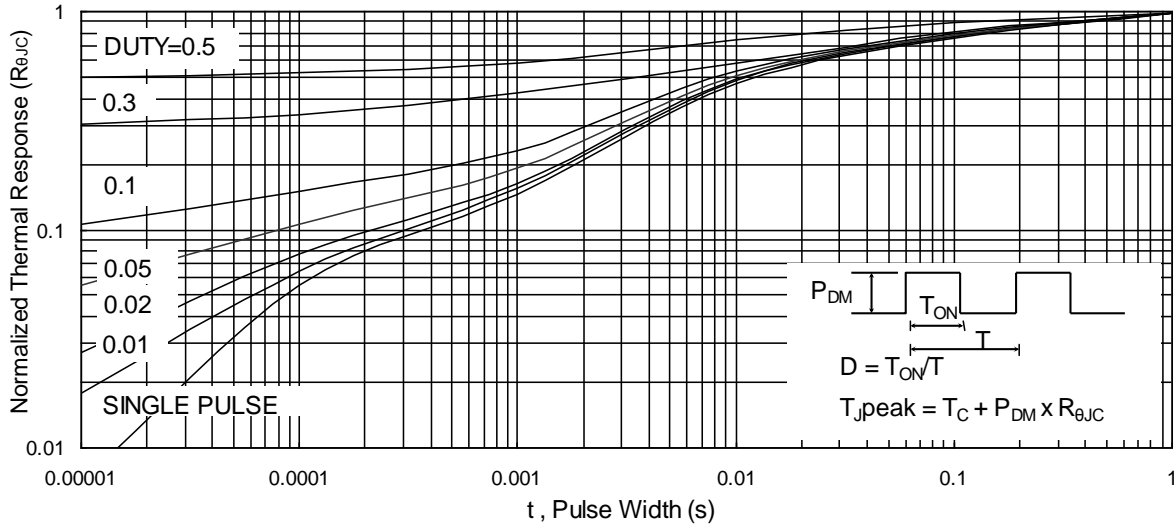$$D = T_{ON}/T$$

$$T_J peak = T_C + P_{DM} \times R_{\theta JC}$$

Fig.9 Normalized Maximum Transient Thermal Impedance

Fig.10 Switching Time Waveform

$$EAS = \frac{1}{2} L \times (-I_{AS}^2) \times \frac{-BV_{DSS}}{-BV_{DSS}-(-V_{DD})}$$

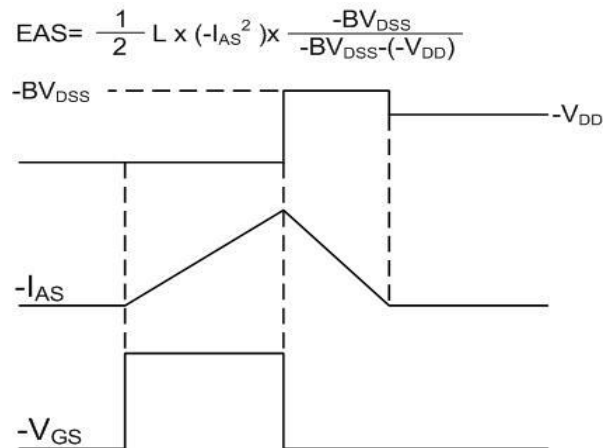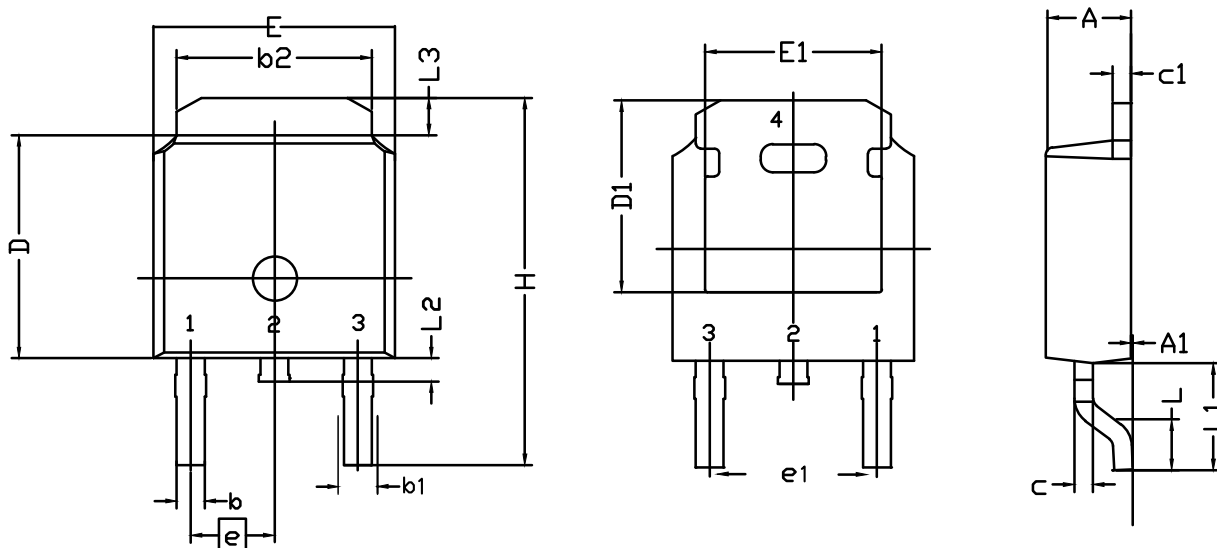**Fig.11 Unclamped Inductive Waveform**

TO-252 Package Outline Dimensions

Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
A	2.20	2.30	2.38	E	6.40	6.60	6.731
A_1	0.00	0.10	0.20	E_1	4.40	--	--
b	0.64	0.76	0.89	e	2.286 BSC		
b_1	0.77	0.85	1.14	e_1	4.572 BSC		
b_2	5.00	5.33	5.46	H	9.40	10.00	10.40
c	0.458	0.508	0.610	L	1.40	1.52	1.77
C_1	0.458	0.508	0.620	L_1	--	2.743	--
D	5.98	6.10	6.223	L_2	0.60	0.80	1.01
D_1	5.20	5.25	5.38	L_3	0.90	1.06	1.25