AP03350K

30V P-Channel MOSFET

RoHS

Features

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

Product Summary

V_{DS}	-30	V
I_D	-35	A
$R_{DS(ON)}$ (at V_{GS}=-10V)	20	mΩ
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	32	mΩ

Applications

- High Frequency Point-of-Load,Synchronous Buck Converter
- Networking DC-DC Power System
- Load Switch
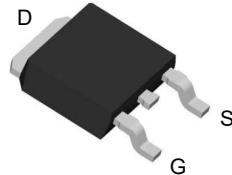
TO-252 Top View
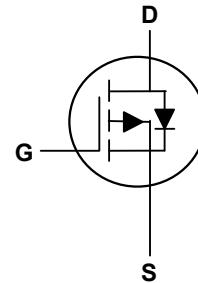
Absolute Maximum Ratings(T_C=25℃, unless otherwise noted)

Parameter	Symbol	Rating		Units
		10S	Steady State	
Drain-Source Voltage	V_{DS}	-30		V
Gate-Source Voltage	V_{GS}	±20		V
Continuous Drain Current, VGS @ -10V[1]	I_D@T_C=25℃	-35		A
Continuous Drain Current, VGS @ -10V[1]	I_D@T_C=100℃	-22		A
Continuous Drain Current, VGS @ -10V[1]	I_D@T_A=25℃	-13.4	-8.5	A
Continuous Drain Current, VGS @ -10V[1]	I_D@T_A=70℃	-10.7	-6.8	A
Pulsed Drain Current[2]	I_{DM}	-70		A
Single Pulse Avalanche Energy[3]	EAS	72.2		mJ
Avalanche Current	I_{AS}	-38		A
Total Power Dissipation[4]	P_D@T_C=25℃	34.7		W
Total Power Dissipation[4]	P_D@T_A=25℃	5	2	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](t ≤10s)	$R_{\theta JA}$	---	25	℃/W
Thermal Resistance Junction-Ambient[1]		---	62	℃/W
Thermal Resistance Junction-Case[1]	$R_{\theta JC}$	---	3.6	℃/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	-30	---	---	V
BV$_{DSS}$ Temperature Coefficient	△BV$_{DSS}$/△T$_J$	Reference to 25℃ , I$_D$=-1mA	---	-0.022	---	V/℃
Static Drain-Source On-Resistance[2]	R$_{DS(ON)}$	V$_{GS}$=-10V , I$_D$=-15A	---	---	20	mΩ
		V$_{GS}$=-4.5V , I$_D$=-10A	---	---	32	mΩ
Gate Threshold Voltage	V$_{GS(th)}$	V$_{GS}$=V$_{DS}$, I$_D$ =-250uA	-1.0	---	-2.5	V
V$_{GS(th)}$ Temperature Coefficient	△V$_{GS(th)}$		---	4.6	---	mV/℃
Drain-Source Leakage Current	I$_{DSS}$	V$_{DS}$=-24V , V$_{GS}$=0V , T$_J$=25℃	---	---	-1	uA
		V$_{DS}$=-24V , 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$_{DS}$=-5V , I$_D$=-10A	---	5	---	S
Gate Resistance	R$_g$	V$_{DS}$=0V , V$_{GS}$=0V , f=1MHz	---	13	---	Ω
Total Gate Charge	Q$_g$	V$_{DS}$=-15V , V$_{GS}$=-4.5V , I$_D$=-15A	---	12.5	---	nC
Gate-Source Charge	Q$_{gs}$		---	5.4	---	
Gate-Drain Charge	Q$_{gd}$		---	5	---	
Turn-On Delay Time	T$_{d(on)}$	V$_{DD}$=-15V , V$_{GS}$=-10V , R$_G$=3.3Ω, I$_D$=-15A	---	4.4	---	ns
Rise Time	T$_r$		---	11.2	---	
Turn-Off Delay Time	T$_{d(off)}$		---	34	---	
Fall Time	T$_f$		---	18	---	
Input Capacitance	C$_{iss}$	V$_{DS}$=-15V , V$_{GS}$=0V , f=1MHz	---	1345	---	pF
Output Capacitance	C$_{oss}$		---	194	---	
Reverse Transfer Capacitance	C$_{rss}$		---	158	---	

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	---	---	-35	A
Pulsed Source Current[2,5]	I$_{SM}$		---	---	-70	A
Diode Forward Voltage[2]	V$_{SD}$	V$_{GS}$=0V , I$_S$=-1A , T$_J$=25℃	---	---	-1.2	V
Reverse Recovery Time	t$_{rr}$	I$_F$=-15A , di/dt=100A/µs，T$_J$=25℃	---	12.4	---	nS
Reverse Recovery Charge	Q$_{rr}$		---	5	---	nC

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$_{DD}$=-25V,V$_{GS}$=-10V,L=0.1mH

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

5. The data is theoretically the same as I$_D$ and I$_{DM}$, in real applications , should be limited by total power dissipation.

Typical Characteristics
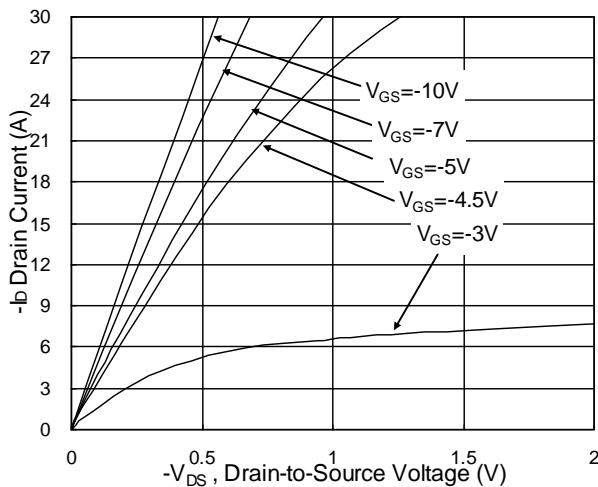

Fig.1 Typical Output Characteristics
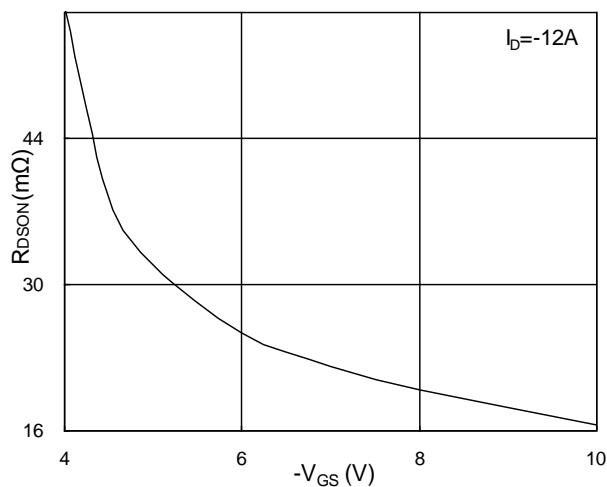
**Fig.2 On-Resistance v.s Gate-Source**
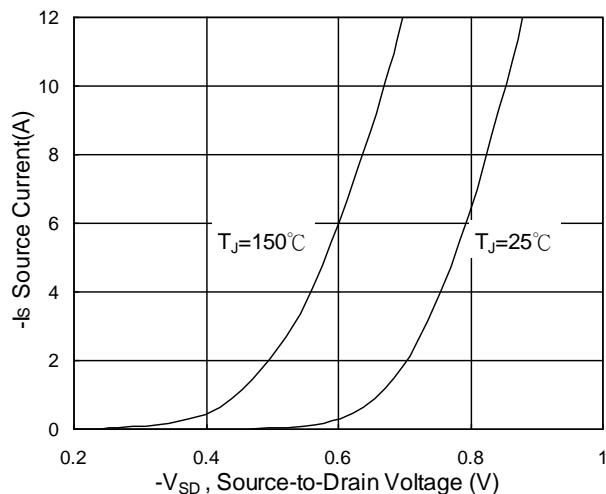
**Fig.3 Forward Characteristics of Reverse**
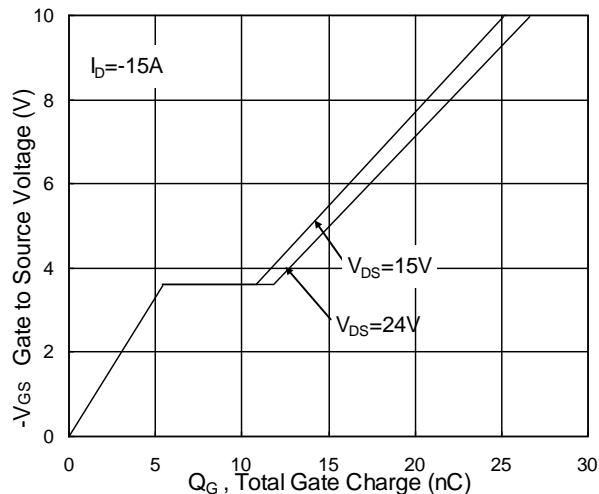
Fig.4 Gate-Charge Characteristics
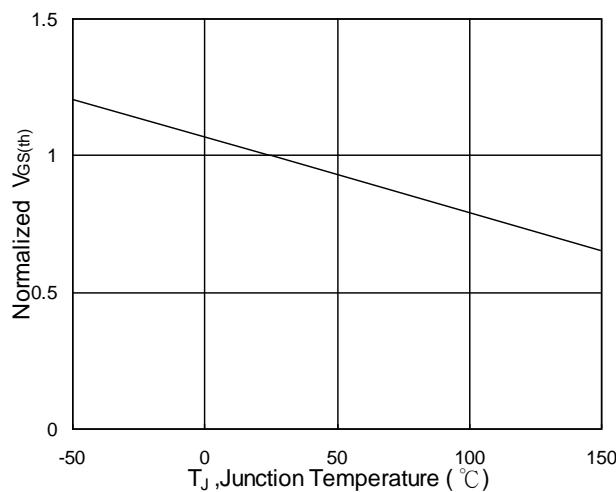
Fig.5 Normalized $V_{GS(th)}$ v.s T_J
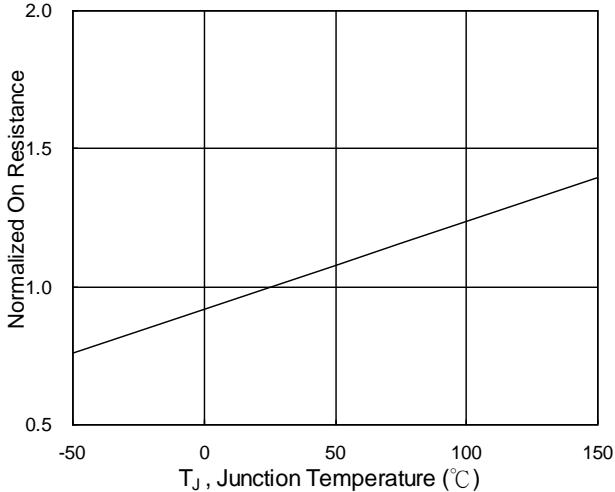
**Fig.6 Normalized R_{DSON} v.s T_J**

Fig.7 Capacitance

Fig.8 Safe Operating Area

Fig.9 Normalized Maximum Transient Thermal Impedance

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

$$T_J peak = T_C + P_{DM} \times R_{\theta JC}$$
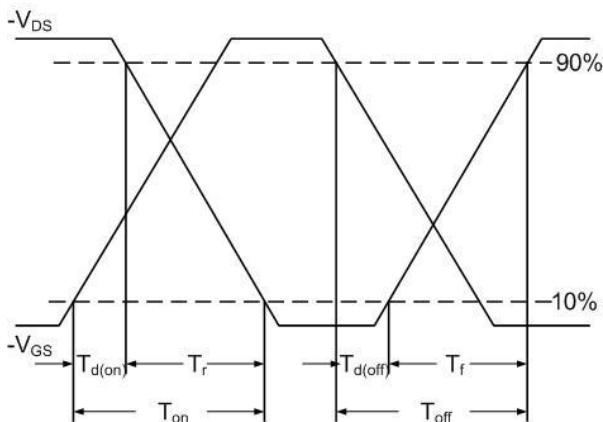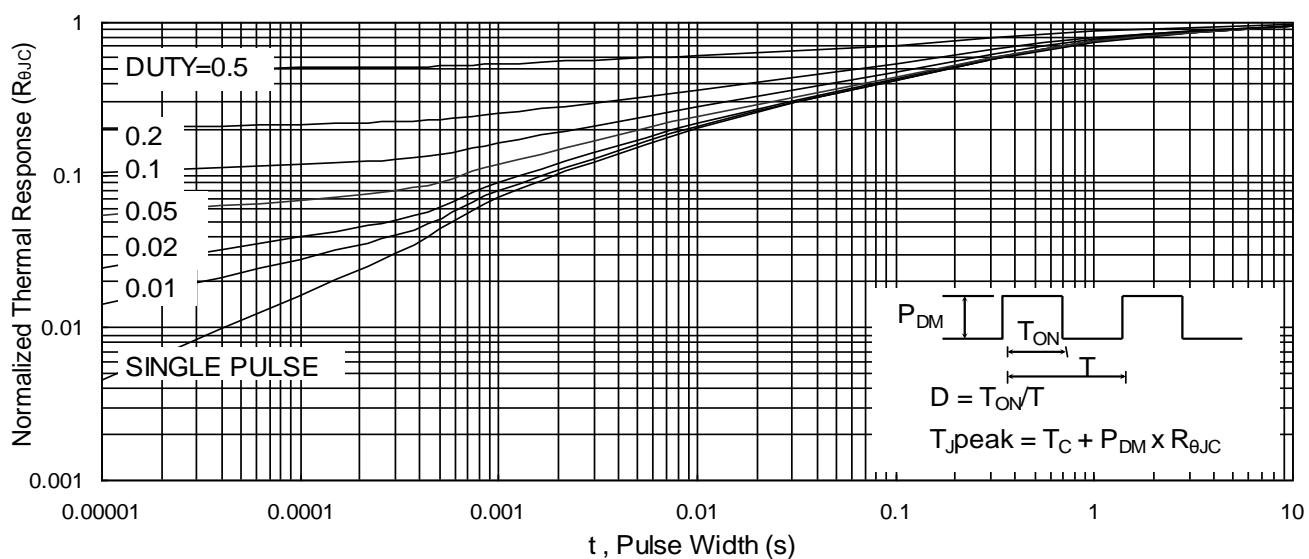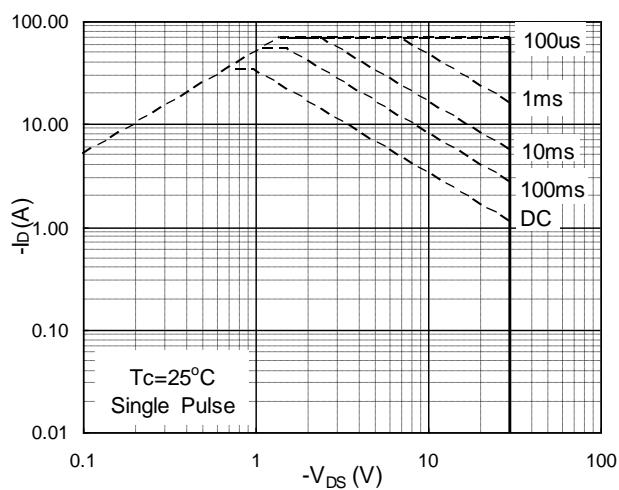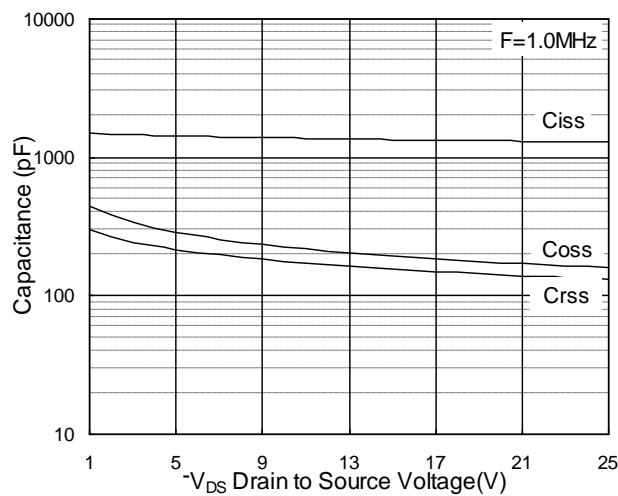
Fig.10 Switching Time Waveform

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

Fig.11 Unclamped Inductive Switching Waveform
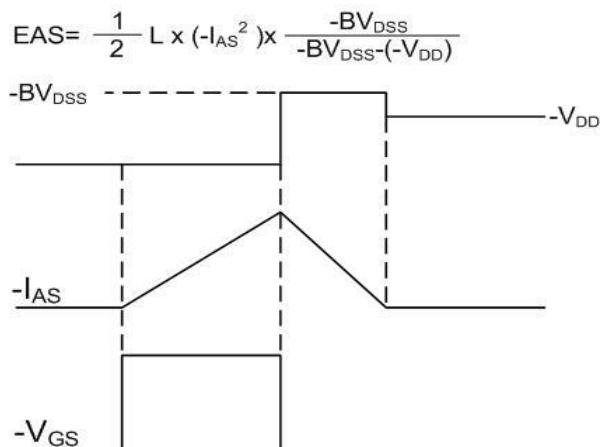
TO-252 Package Outline Dimensions
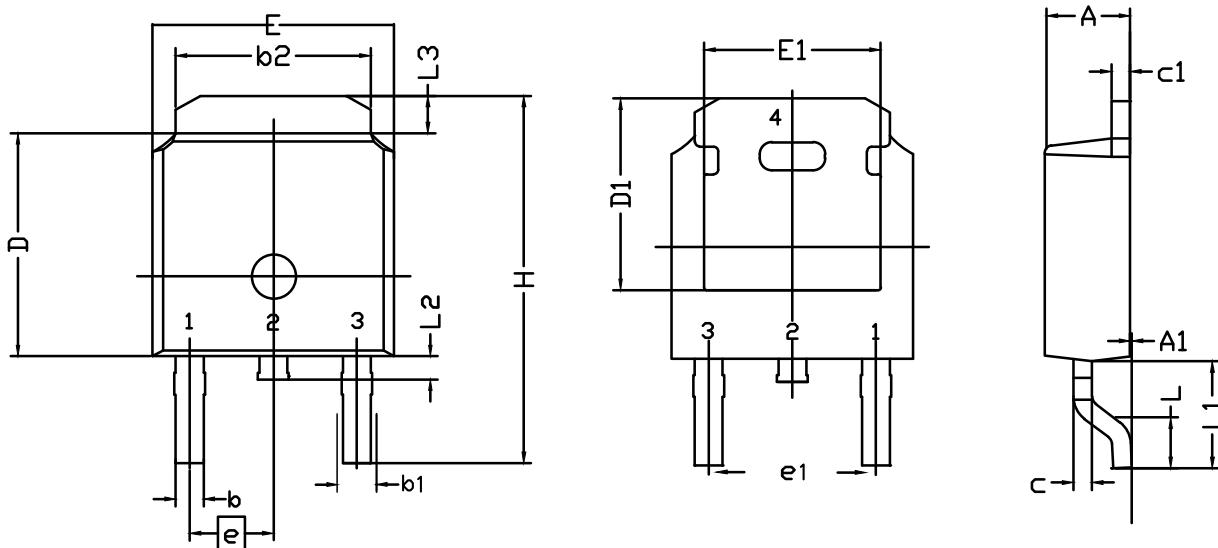
Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	**Typ**	**Max**		**Min**	**Typ**	**Max**
A	2.20	2.30	2.38	**E**	6.40	6.60	6.731
A$_1$	0.00	0.10	0.20	**E$_1$**	4.40	--	--
b	0.64	0.76	0.89	**e**	2.286 BSC		
b$_1$	0.77	0.85	1.14	**e$_1$**	4.572 BSC		
b$_2$	5.00	5.33	5.46	**H**	9.40	10.00	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