ATP04400K

40V P-Channel MOSFET

Features

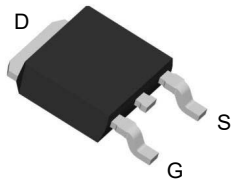
- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available

Product Summary

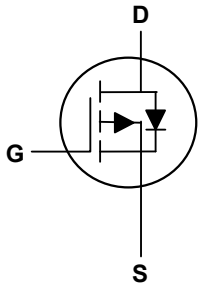
V_{DS}	-40	V
I_D	-40	A
$R_{DS(ON)}$(at V_{GS}=-10V)	13	mΩ
$R_{DS(ON)}$(at V_{GS}=-4.5V)	22	mΩ

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
Drain-Source Voltage		V_{DS}	-40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current[1]	T_C=25℃	I_D	-40	A
Continuous Drain Current[1]	T_C=100℃	I_D	-26	A
Pulsed Drain Current[2]		I_{DM}	-160	A
Single Pulse Avalanche Energy[3]		EAS	210	mJ
Total Power Dissipation[4]		P_D	34.5	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-Case[1]	$R_{\theta JC}$	---	3.5	℃/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	-40	---	---	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V , I_D=-20A	---	10	13	mΩ
		V_{GS}=-4.5V , I_D=-10A	---	15	22	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =-250uA	-1.0	-1.7	-2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-40V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
Forward Transconductance	gfs	V_{DS}=-5V , I_D=-30A	---	36	---	S
Total Gate Charge	Q_g	V_{DS}=-20V , V_{GS}=-10V, I_D=-30A	---	38	---	nC
Gate-Source Charge	Q_{gs}		---	9	---	
Gate-Drain Charge	Q_{gd}		---	16.5	---	
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=-20V , V_{GS}=-10V, R_G=3.3Ω, I_D=-20A	---	10	---	ns
Rise Time	T_r		---	41	---	
Turn-Off Delay Time	$T_{d(off)}$		---	81	---	
Fall Time	T_f		---	86	---	
Input Capacitance	C_{iss}	V_{DS}=-20V , V_{GS}=0V , f=1MHz	---	3050	---	pF
Output Capacitance	C_{oss}		---	310	---	
Reverse Transfer Capacitance	C_{rss}		---	210	---	

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current[1]	I_S	T_C=25℃	---	---	-40	A
Diode Forward Voltage[2]	V_{SD}	V_{GS}=0V ,I_S=-1A , T_J=25℃	---	---	-1.0	V
Reverse Recovery Time	t_{rr}	I_F=-30A ,di/dt=100A/μs, T_J=25℃	---	8.3	---	nS
Reverse Recovery Charge	Q_{rr}		---	1.8	---	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=0.5mH

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

Typical Characteristics

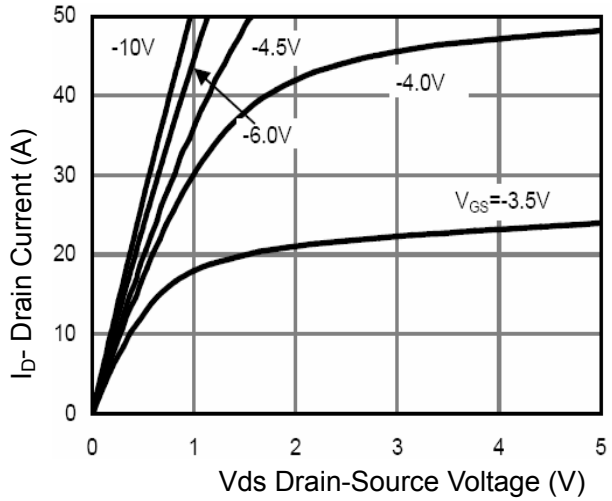


Figure 1 Output Characteristics

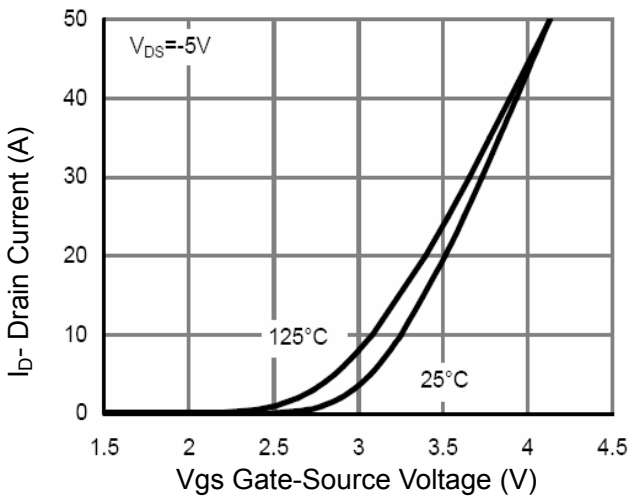


Figure 2 Transfer Characteristics

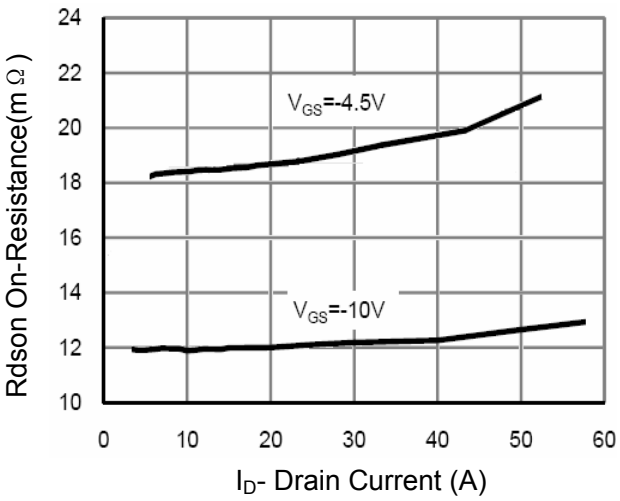


Figure 3 Rdson- Drain Current

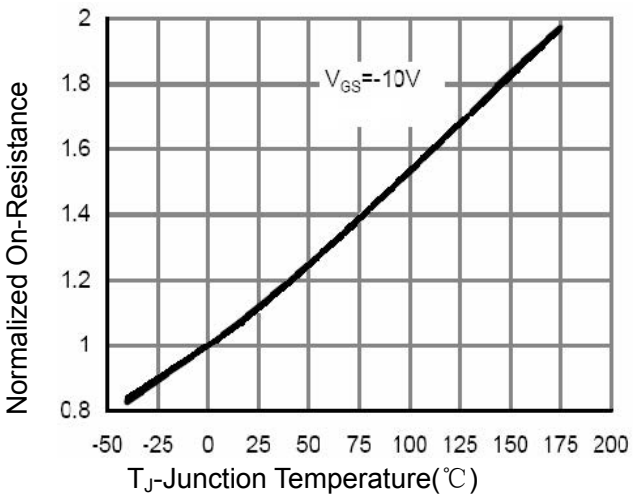


Figure 4 Rdson-Junction Temperature

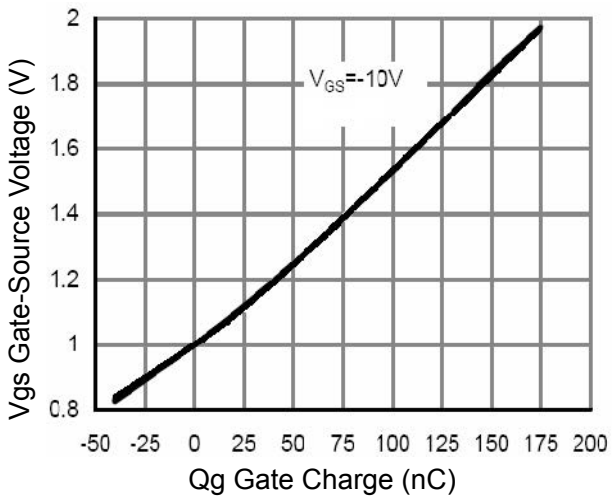


Figure 5 Gate Charge

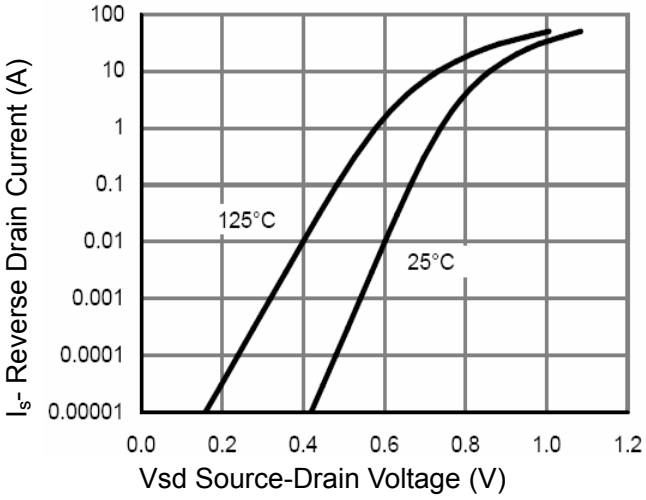


Figure 6 Source- Drain Diode Forward

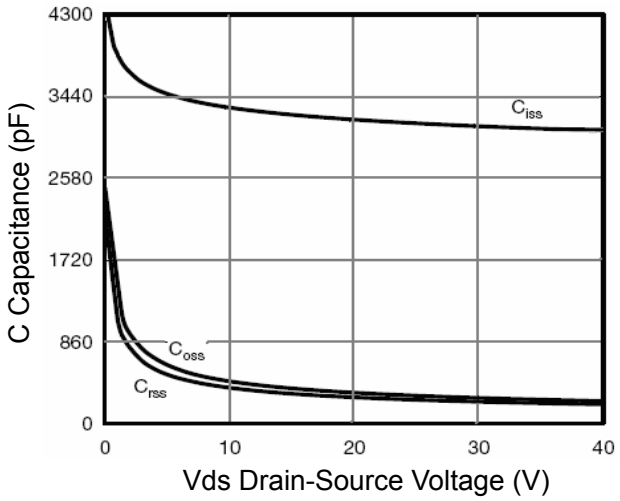


Figure 7 Capacitance vs Vds

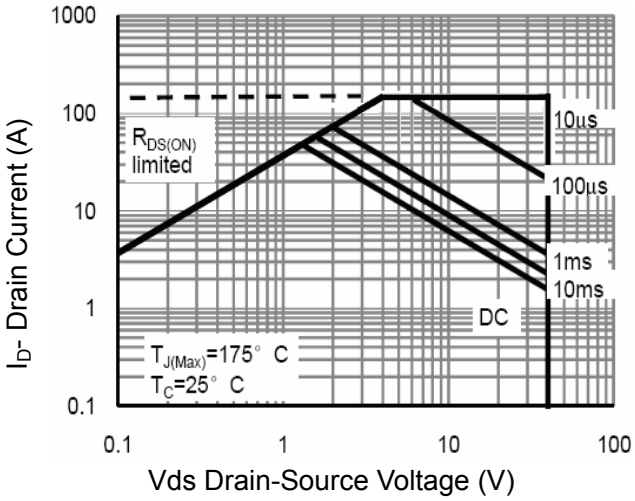


Figure 8 Safe Operation Area

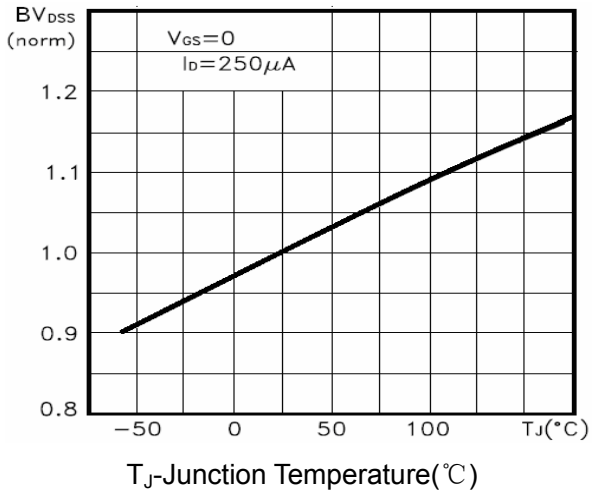


Figure 9 BV_{DSS} vs Junction Temperature

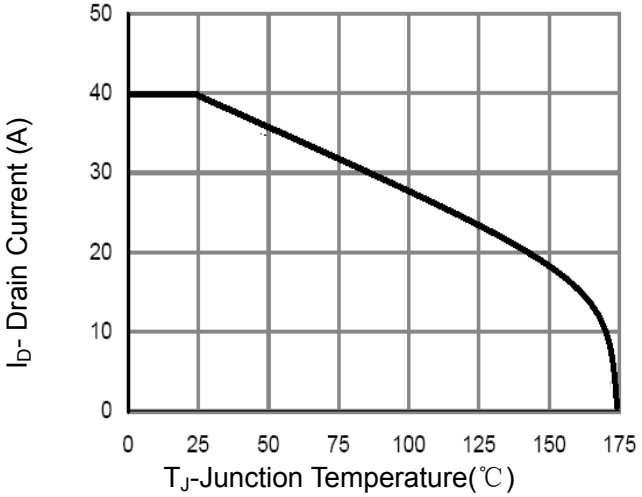


Figure 10 ID Current Derating vs Junction Temperature

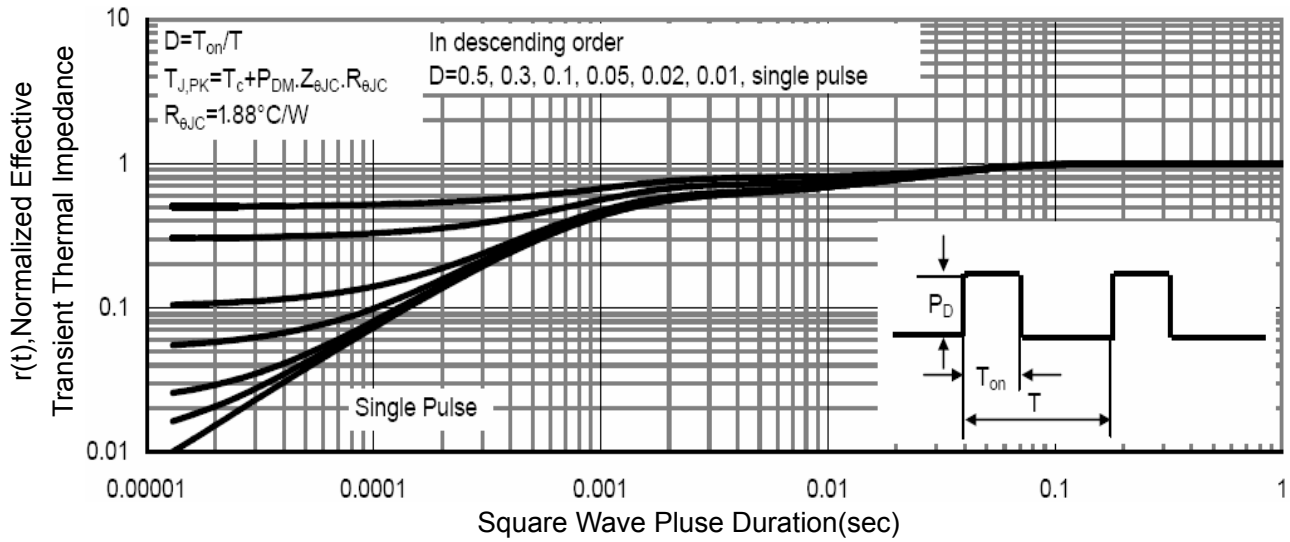
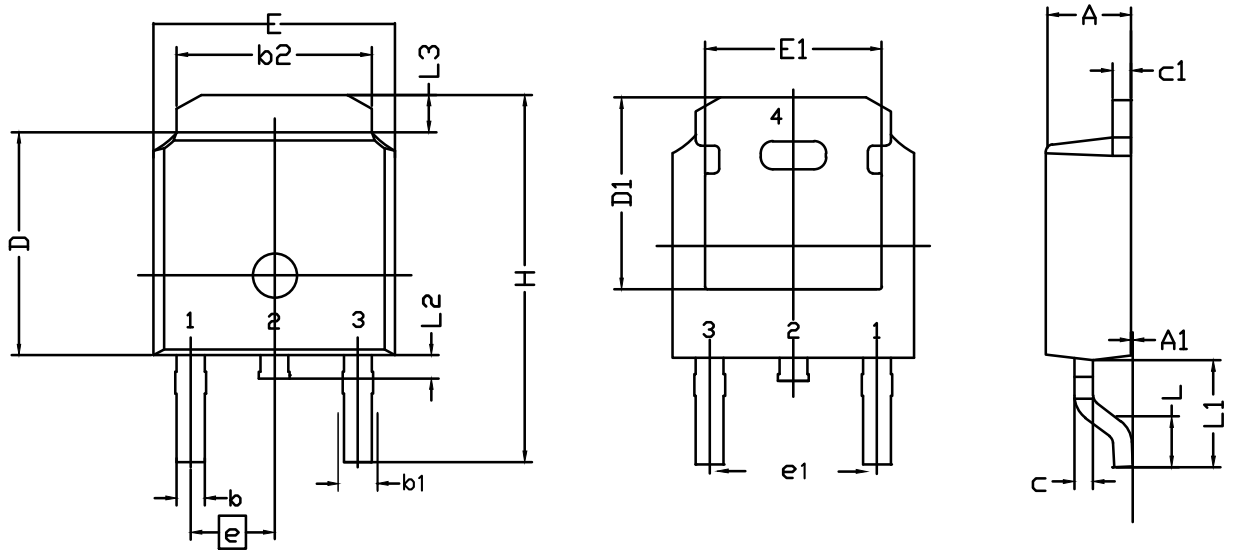


Figure 11 Normalized Maximum Transient Thermal Impedance

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