

AP40N100K

N-Channel Power MOSFET

Product Summary

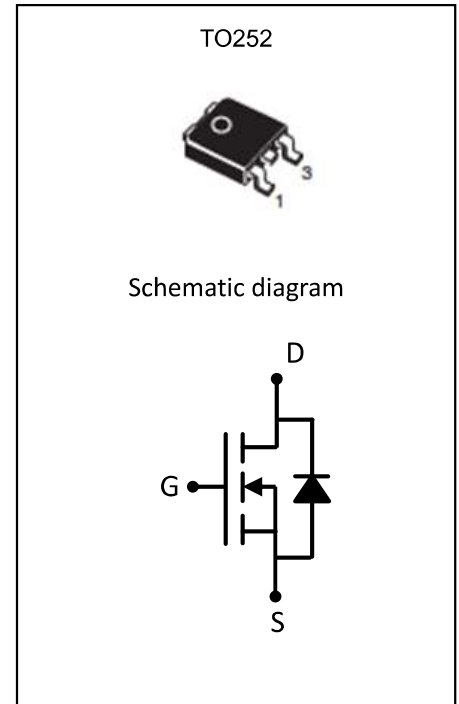
$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
100V	25mΩ@10V	40A
	38mΩ@4.5V	

Feature

- TrenchFET Power MOSFET
- Fast Switching
- Exceptional on-resistance and maximum DC current capability

Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AP40N100K	AP40N100K	TO-252-3L		-	-

ABSOLUTE MAXIMUM RATINGS ($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	+20/-12	V
Continuous Drain Current	I_D	40	A
Pulsed Drain Current	I_{DM}	150	A
Single pulse avalanche energy	EAS	95	mJ
Power Dissipation	P_D	40	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	3	$^{\circ}\text{C}/\text{W}$
Junction Temperature	T_J	150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^{\circ}\text{C}$

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MOSFET ELECTRICAL CHARACTERISTICS(T_a=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	100			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = 100V, V _{GS} = 0V			1	μA
Gate-body leakage current	I _{GSS}	V _{GS} = +20V, V _{DS} = 0V			±100	nA
Gate threshold voltage ⁽¹⁾	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	1	1.6	2.5	V
Drain-source on-resistance ⁽¹⁾	R _{DS(on)}	V _{GS} = 10V, I _D = 15A		20	25	mΩ
		V _{GS} = 4.5V, I _D = 10A		30	38	
Forward transconductance ⁽¹⁾	g _{FS}	V _{DS} = 10V, I _D = 15A		10		S
Dynamic characteristics⁽²⁾						
Input Capacitance	C _{iss}	V _{DS} = 50V, V _{GS} = 0V, f = 1MHz		1015		pF
Output Capacitance	C _{oss}			285		
Reverse Transfer Capacitance	C _{rss}			27		
Switching characteristics⁽²⁾						
Turn-on delay time	t _{d(on)}	V _{DD} = 50V, I _D = 1A, R _L = 6Ω V _{GS} = 10V, R _G = 1Ω		10	20	ns
Turn-on rise time	t _r			13.5	27	
Turn-off delay time	t _{d(off)}			28	56	
Turn-off fall time	t _f			20	40	
Total Gate Charge	Q _g	V _{DS} = 50V, I _D = 10A, V _{GS} = 10V		15	30	nC
Gate-Source Charge	Q _{gs}			1.5		
Gate-Drain Charge	Q _{gd}			4.2		
Source-Drain Diode characteristics						
Diode Forward voltage ⁽¹⁾	V _{DS}	V _{GS} = 0V, I _S = 1A			1	V

Notes:

1. Pulse test; pulse width ≤ 300μs, duty cycle ≤ 2%.
2. Guaranteed by design, not subject to production testing.

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RATING AND CHARACTERISTICS CURVES

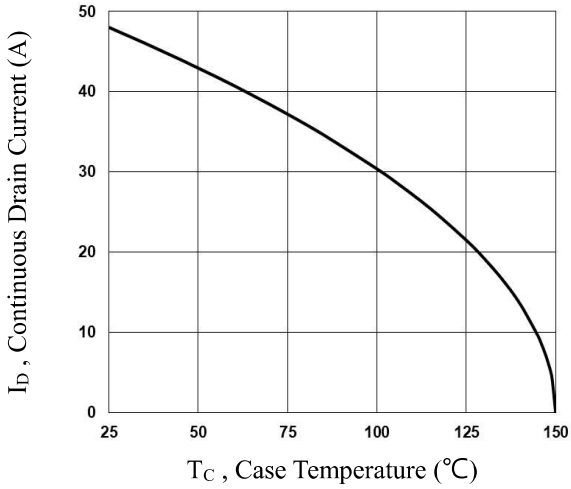


Fig.1 Continuous Drain Current vs. T_c

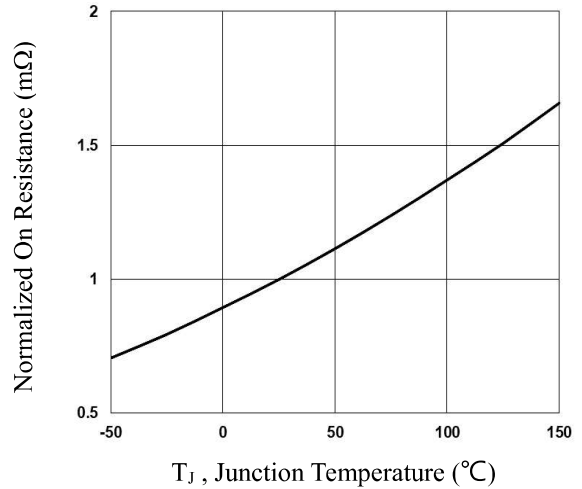


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

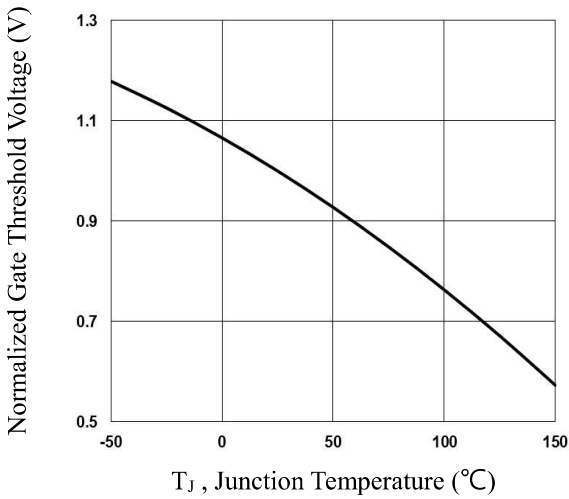


Fig.3 Normalized V_{th} vs. T_j

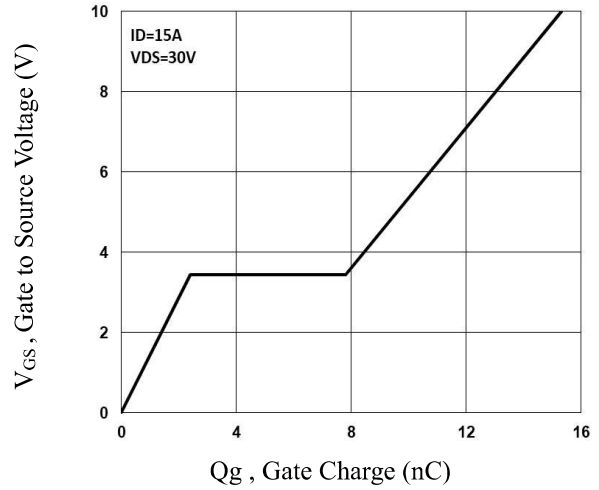


Fig.4 Gate Charge Waveform

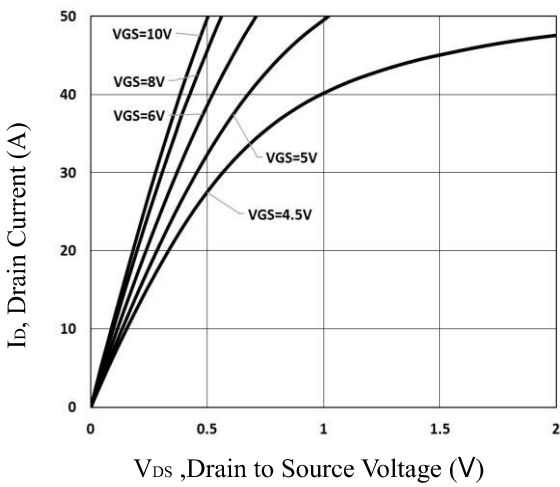


Fig.5 Typical Output Characteristics

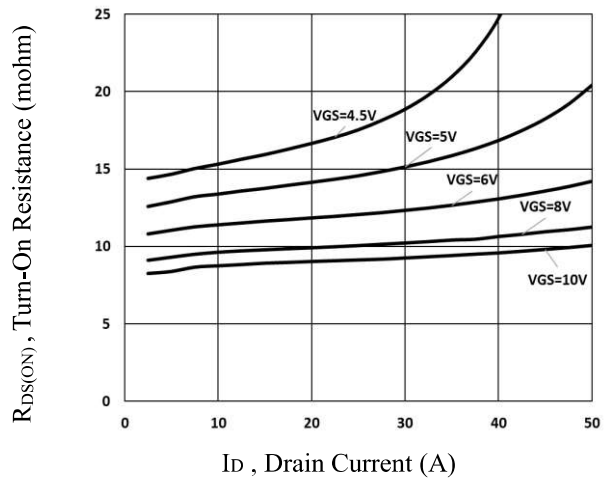


Fig.6 Turn-On Resistance vs. I_D

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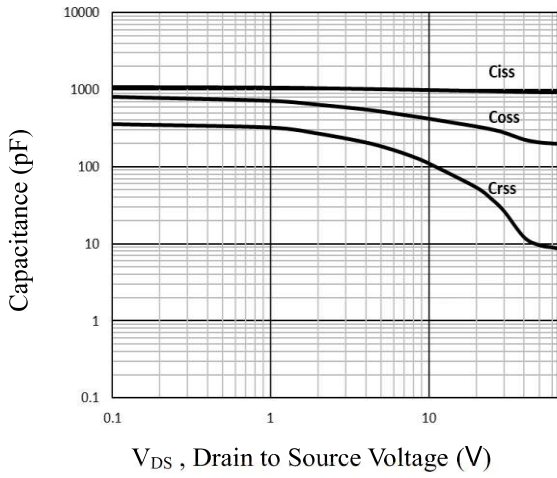


Fig.7 Capacitance Characteristics

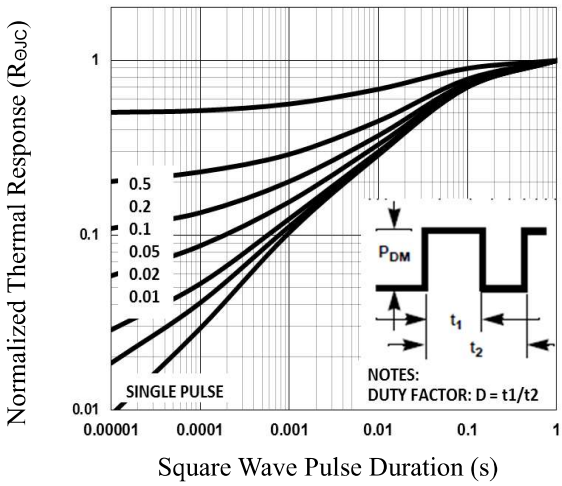


Fig.8 Normalized Transient Response

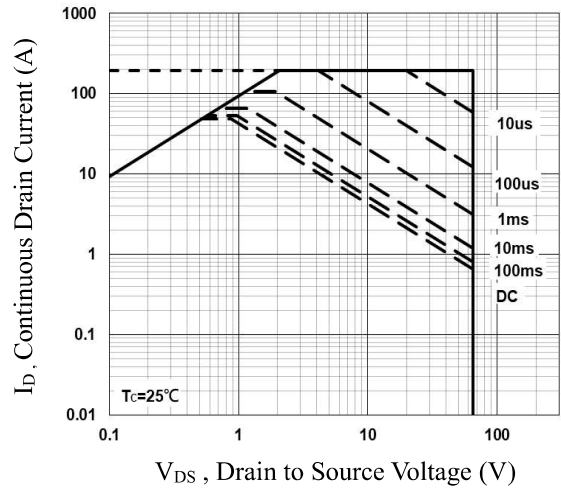


Fig.9 Maximum Safe Operation Area

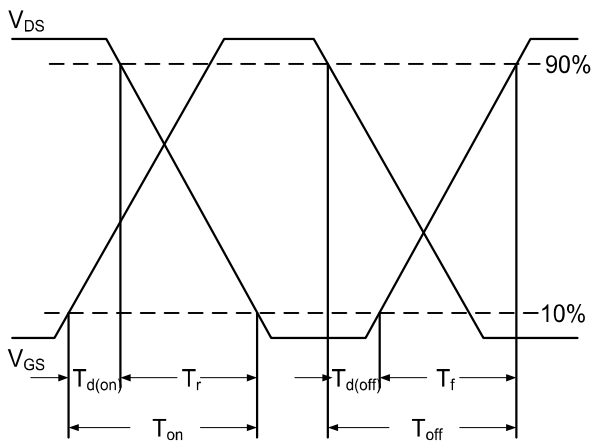


Fig.10 Switching Time Waveform

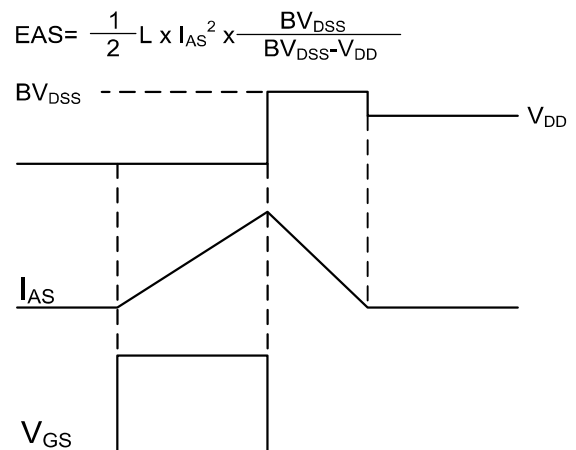
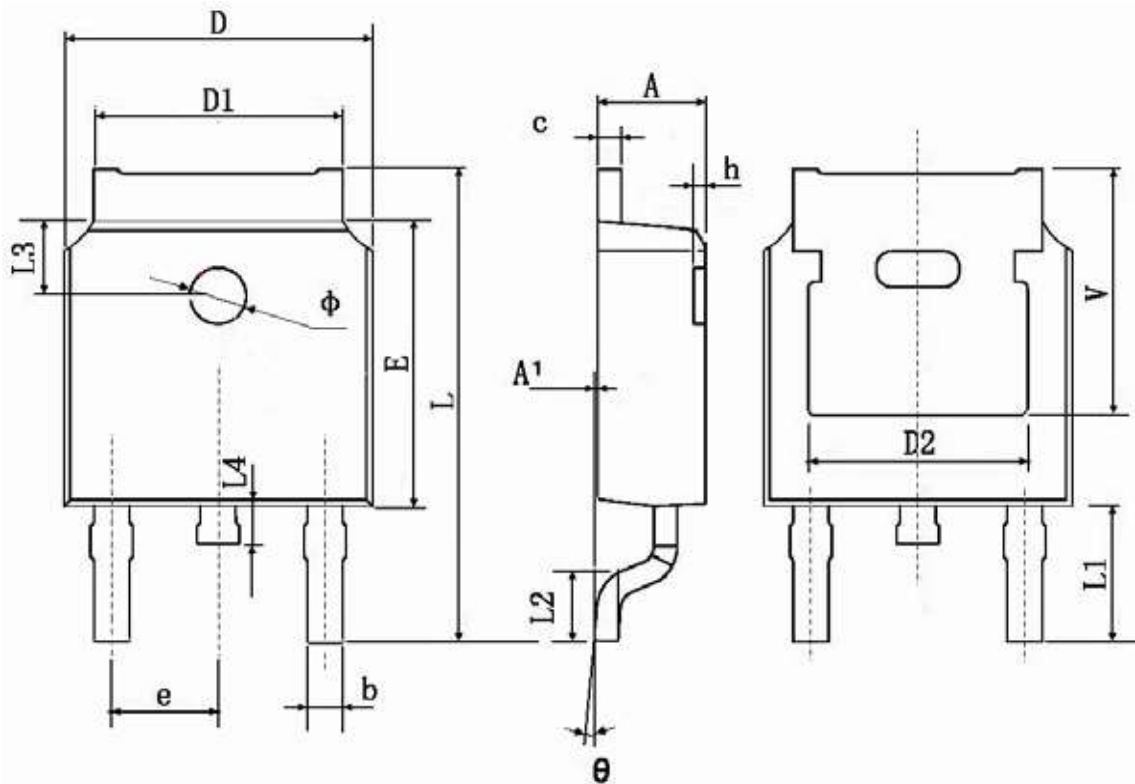


Fig.11 EAS Waveform

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

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TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	