PWEG140N70E

PW 700V GaN HEMT

重庆平伟实业股份有限公司

Features

- Enhancement mode transistor-Normally off power switch
- No reverse-recovery charge
- Low gate charge, low output charge
- Ultra high switching frequency
- Qualified according to JEDEC for target applications

Applications

- AC-DC converters
- DC-DC converters
- Fast battery charging
- High density power conversion
- High efficiency power conversion

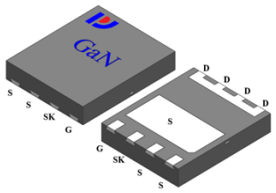
Benefits

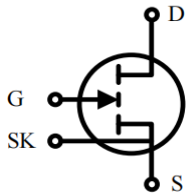
- Enable very high conversion efficiencies
- Supports high operating frequency
- Enables ultrahigh power density designs
- Improved safety & reliability due to cooler operation temperature

Product Summary

V_{DS}	700V
$R_{DS(on)@6.0V\ typ.}$	102mΩ
I_D	17A

DFN5*6





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
PWEG140N70E	EG140N70E	DFN5*6	Tape&Reel	13 inches	12mm	5000pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage（T_J=-55°C to 150°C）	V_{DSS}	700	V
Drain to source voltage transient[1]	$V_{(TR)DSS}$	800	
Drain to source voltage,pulsed[2] T_j = 25 °C; total time < 10 h T_j = 125 °C; total time < 1 h	$V_{DSS,pulse}$	750	V
Continuous current, drain source	I_D	17	A
Pulsed current, drain source[3] V_{GS} = 6V；T_{PULSE} = 10 μs；TC = 25°C ； V_{GS} = 6V；T_{PULSE} = 10 μs；TC = 125°C ；	$I_{D,pulse}$	 32 18	A
Gate source voltage, continuous[4] T_j=-55°C to 150°C	V_{GS}	-6~+7	V
Gate source voltage, pulsed	$V_{GS,pulse}$	-20~+10	V
Power dissipation	P_{tot}	113	W
Operating temperature	T_j	-55~+150	°C
Storage temperature	T_{stg}		
Maximum reflow soldering temperature	T_{sold}	260	°C

1.$V_{DS,\ transient}$ is intended for non-repetitive events, t_{PULSE} < 200 μs.
2.$V_{DS,\ pulse}$ is intended for repetitive pulse, t_{PULSE} < 100 ns.
3.Limit was extracted from characterization test, not measured during production.
4.The minimum V_{GS} is clamped by ESD protection circuit, as shown in Figure 10.

Thermal Resistance

Parameter	Symbol	Limit value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – ambient	R_{thJA}	-	69	-	°C/W	-
Thermal resistance, junction - case	R_{thJC}	-	1.1	-	°C/W	-

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static characteristics						
Gate threshold voltage	$V_{GS(th)}$	1.2 -	1.7 1.7	2.5 -	V	I_D=17.2mA,V_{DS}=V_{GS} Tj=25°C Tj=150°C
Drain-to-source leakage current	I_{DSS}	- -	1 7	20 -	μA	V_{DS}=700V,V_{GS}=0V T_j=25°C T_j=150°C
Gate-source leakage current	I_{GSS}	-	70	-	μA	V_{GS}=6V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	102	140	mΩ	V_{GS}=6V,I_D=5A,T_J=25°C
		-	210	-	mΩ	V_{GS}=6V,I_D=5A,T_J=125°C
Gate resistance	R_G	-	6.8	-	Ω	f = 1 MHz; open drain
Dynamic characteristics						
Input Capacitance	C_{iss}	-	126	-	pF	V_{GS}=0V, V_{DS}=400V, f=100KHz
Output Capacitance	C_{oss}	-	47	-		
Reverse Transfer Capacitance	C_{rss}	-	1	-		
Effective output capacitance, energy related [1]	$C_{o(er)}$	-	59	-		V_{GS}=0V, V_{DS}=0V~400V,
Effective output capacitance, time related[2]	$C_{o(tr)}$	-	82	-		
Output charge	Q_{OSS}	-	33	-	nC	
Turn-on delay time	$t_{d(on)}$	-	3	-	ns	V_{GS}=6V, V_{DS}=400V, $R_{G\_on(ext)}$=10Ω,I_D=10A, $R_{G\_off(ext)}$=2Ω, L=318μH, See Figure 22
Rise time	t_r	-	5	-		
Turn-off delay time	$t_{d(off)}$	-	4	-		
Fall time	t_f	-	4	-		

1.$C_{O(er)}$ is the fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 400 V.
2.$C_{O(tr)}$ is the fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 400 V.

Gate charge characteristics

Gate Total Charge	Q_G	-	3.5	-	nC	V_{DS}=400V,I_D=5A ,V_{GS}=0V-6V
Gate-Source charge	Q_{GS}	-	0.3	-		
Gate-Drain charge	Q_{GD}	-	1.2	-		
Gate Plateau Voltage	V_{Plat}	-	2.1	-	V	V_{DS}=400V,I_D=5A

Reverse Device Characteristic

Parameter	**Symbol**	**Value**			**Unit**	**Test Condition**
		min.	**typ.**	**max.**		
Source to Drain reverse Voltage	V_{SD}	-	7.8	-	V	V_{GS}=0V,I_S=5A
Pulsed current, reverse	$I_{S,pulse}$	-	-	32	A	V_{GS}=6V,t_{PULSE}=10μs
Reverse recovery charge	Q_{rr}	-	0	-	nC	I_S=5A,V_{DS}=400V
Reverse recovery time	t_{RR}	-	0	-	ns	
Peak reverse recovery current	I_{rrm}	-	0	-	A	

Typical Performance Characteristics

Fig 1: Typ. Output Characteristics

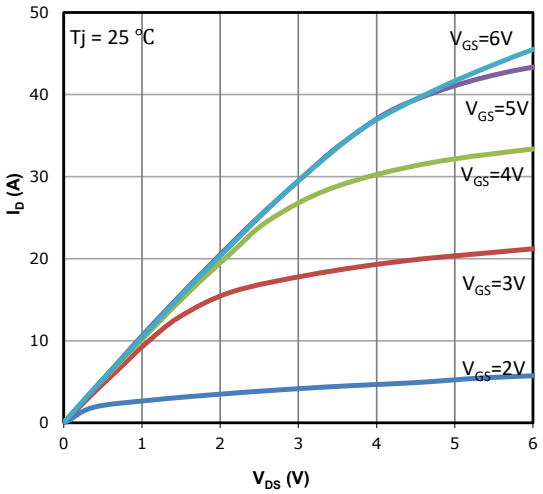


Fig 2: Typ. Output Characteristics

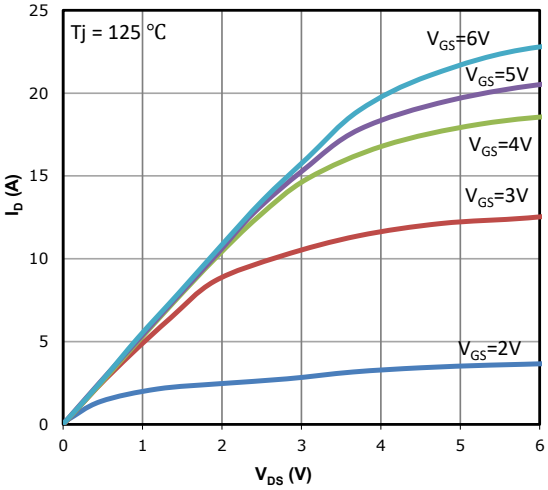


Fig 3:
Typ.Drain-source on-state resistance

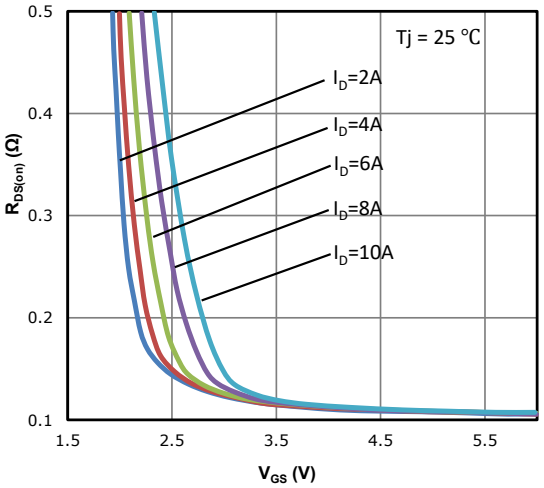


Fig 4:
Typ.Drain-source on-state resistance

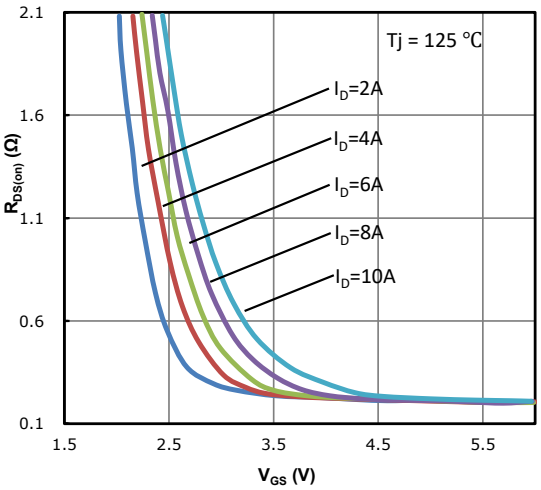


Fig 5:
Typ. channel reverse characteristics

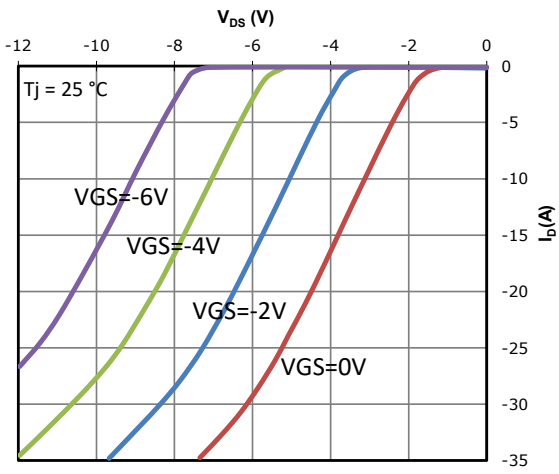


Fig 6:
Typ. channel reverse characteristics

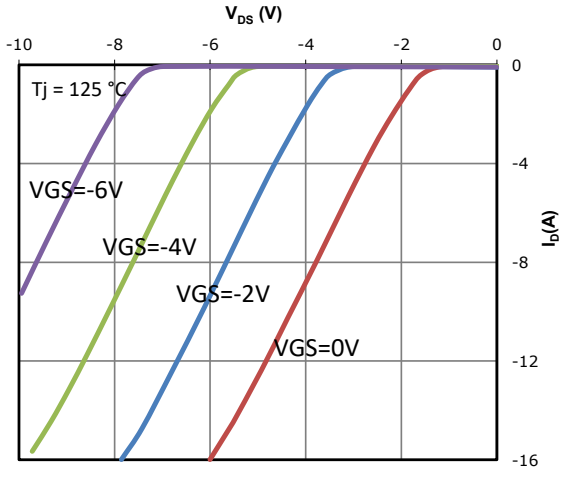


Fig 7:
Typ. channel reverse characteristics

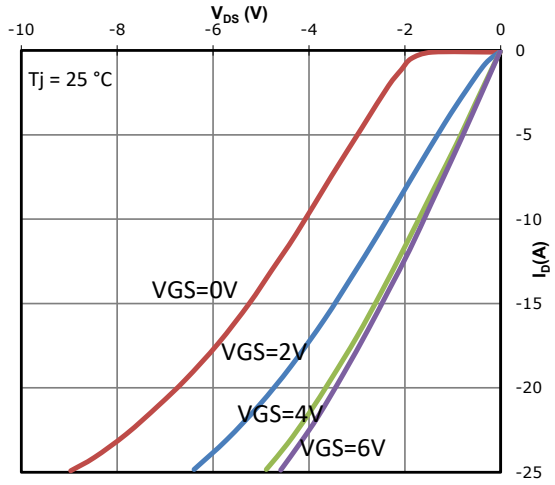


Fig 8:
Typ. channel reverse characteristics

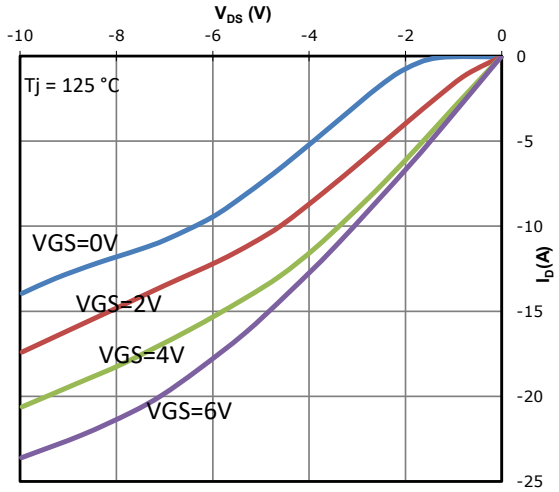


Fig 9: Typ. Transfer Characteristics

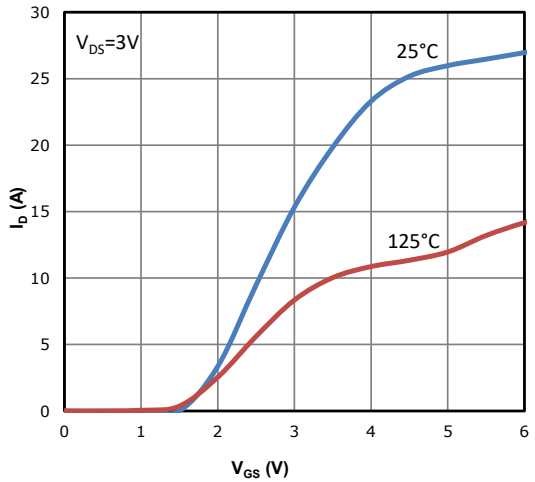


Fig 10: Typ. Gate-to-Source leakage

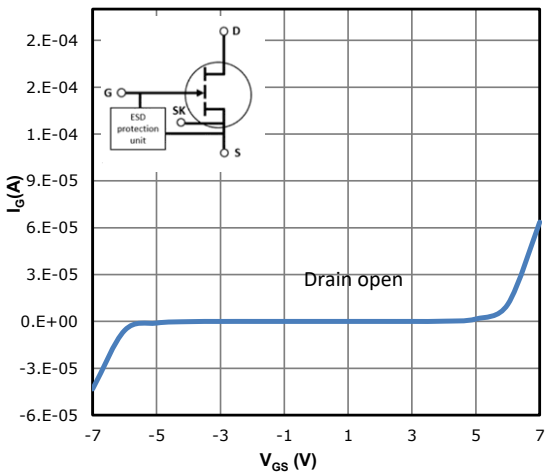


Fig 11:Drain-source leakage characteristics

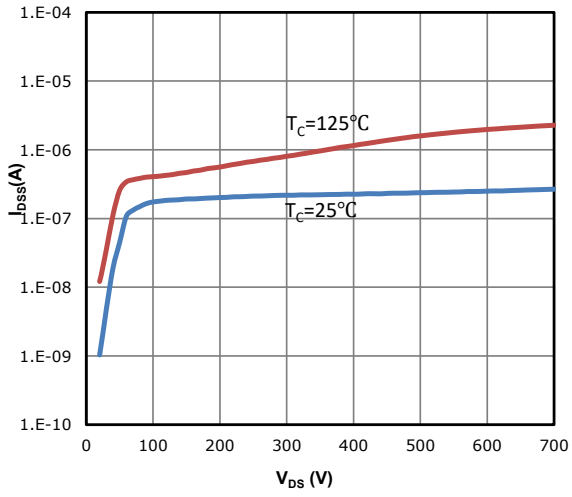


Fig 12: Vgs(th) vs. Temperature

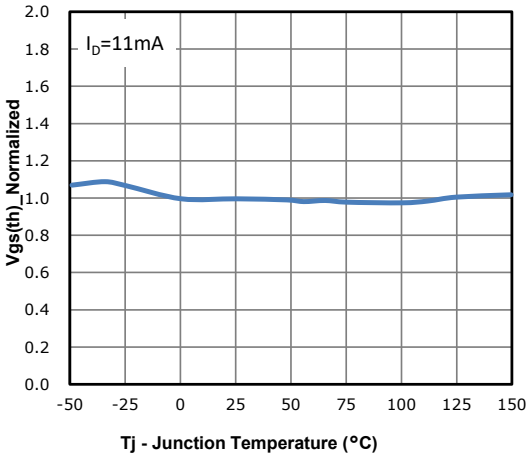


Fig 13: Rds(on) vs. Temperature

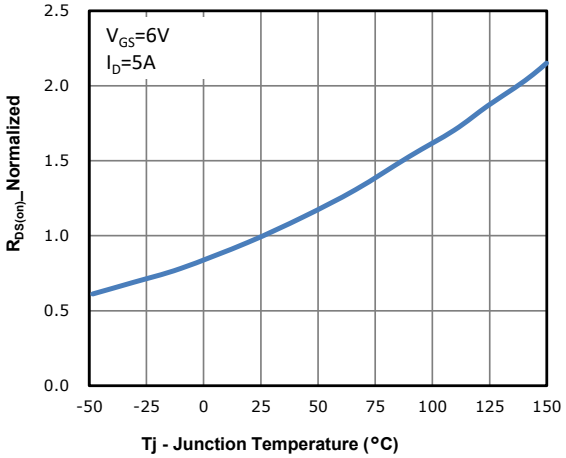


Fig 14: Power Dissipation

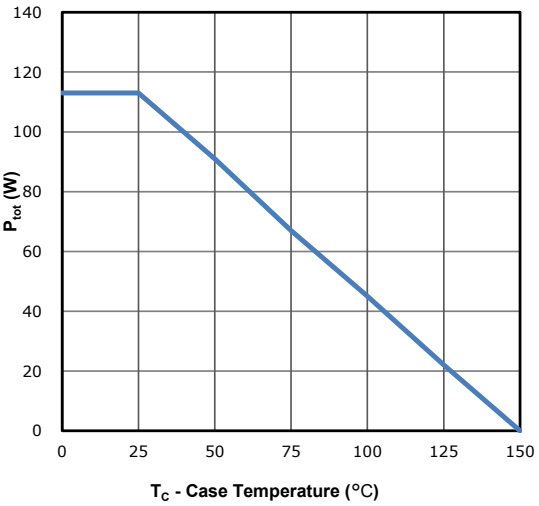


Fig 15:
Max. Transient Thermal Impedance

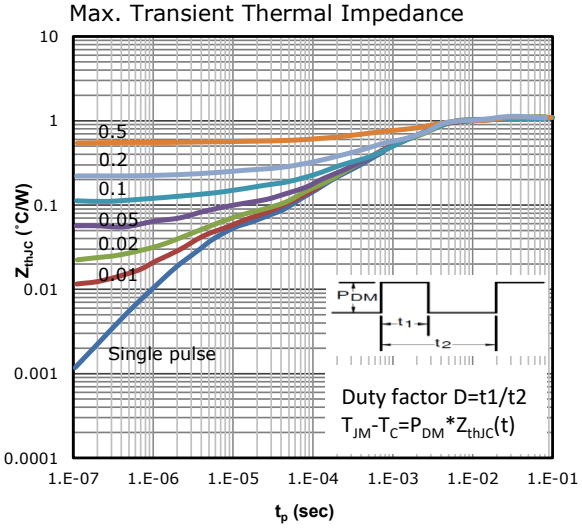


Fig 16: Safe Operating Area

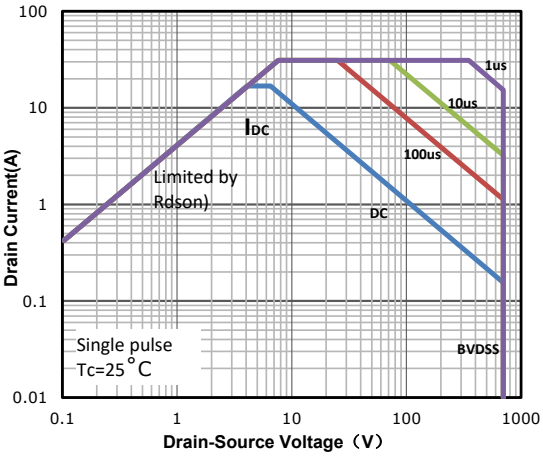


Fig 17: Safe Operating Area

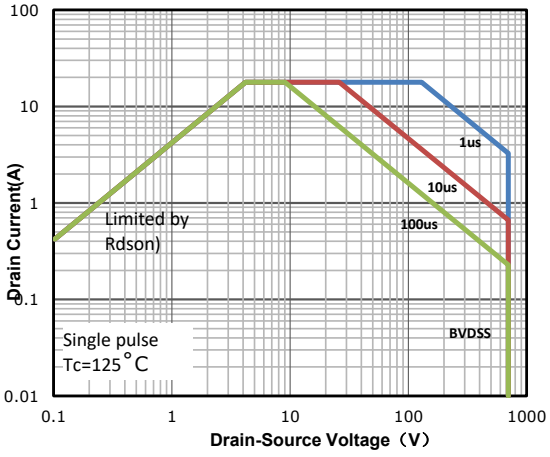


Fig 18: Gate ChargeCharacteristics

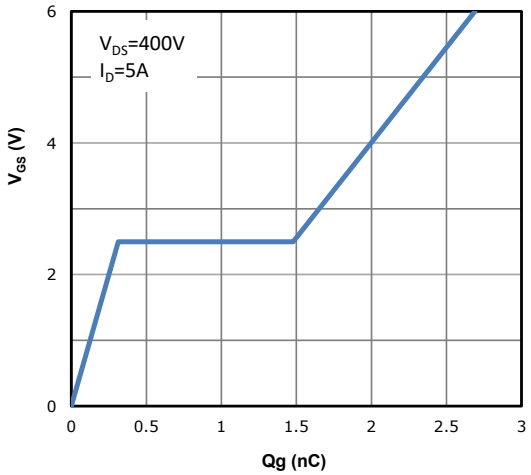


Fig 19: Capacitance Characteristics

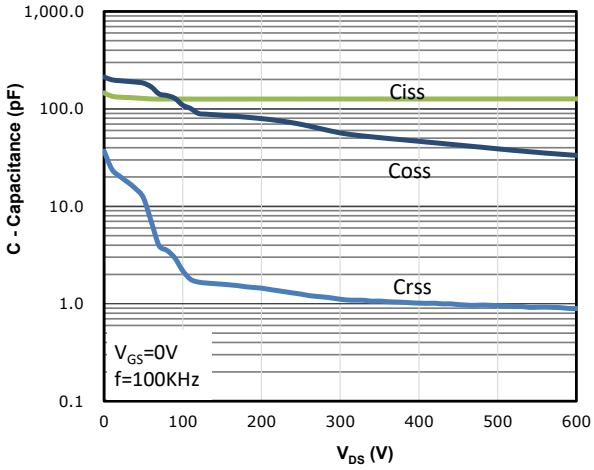


Fig 20: Typ. output charge

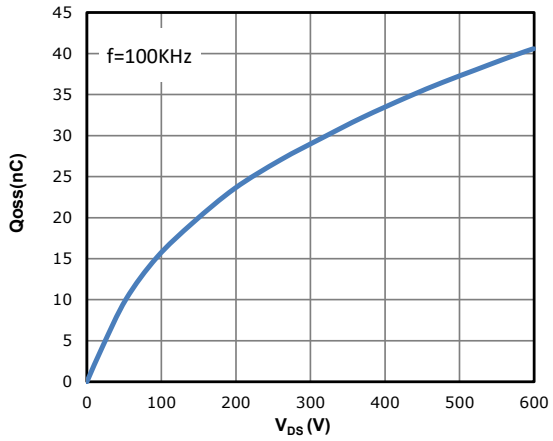
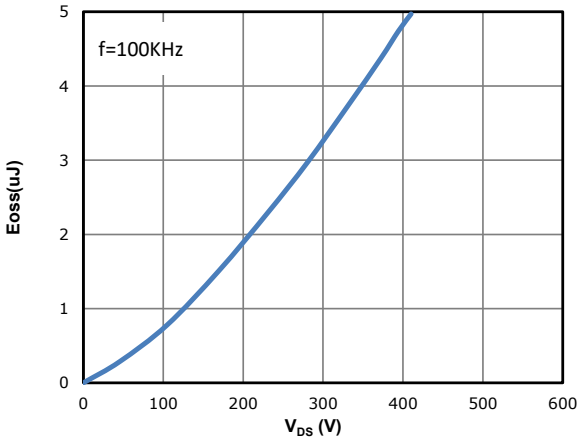
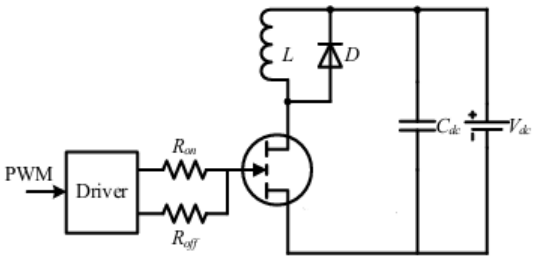


Fig 21: Typ. C_{OSS} stored Energy



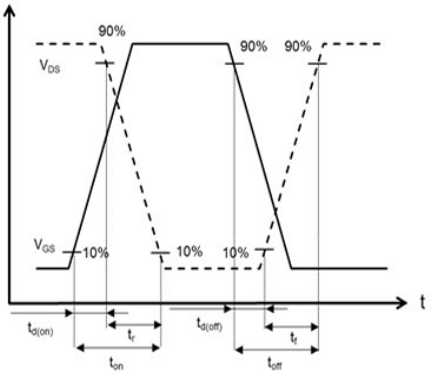
Test Circuit & Waveform

Fig 22：Typ.Switching time with inductive load

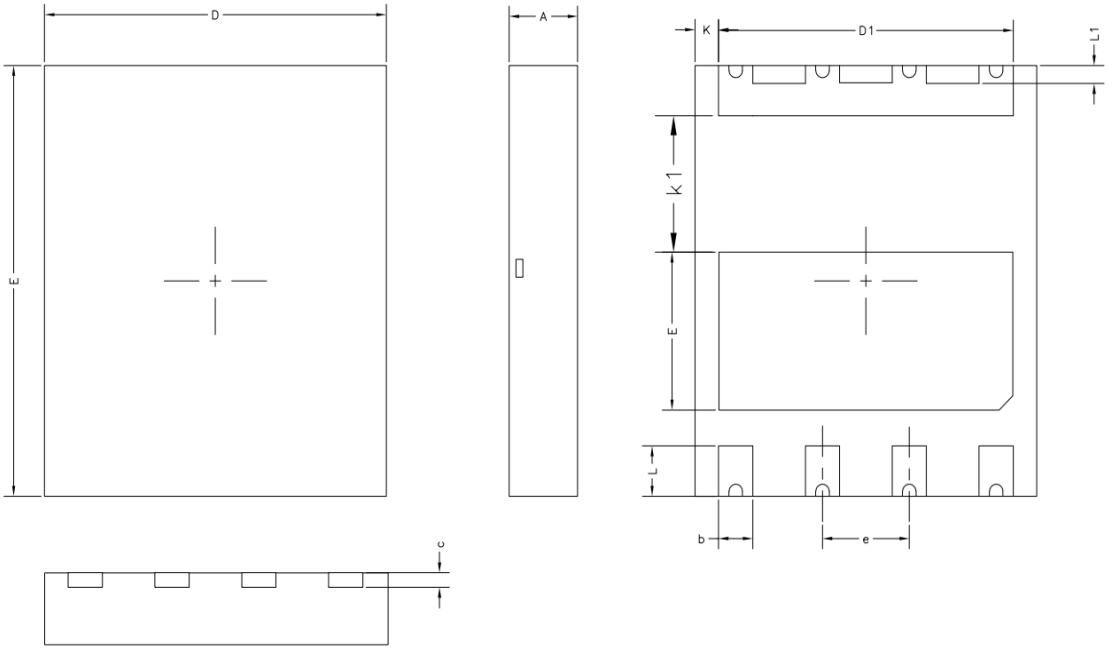


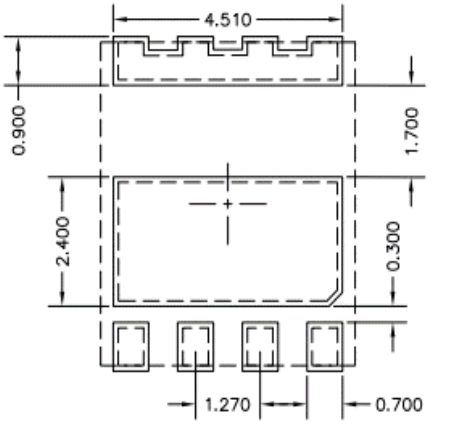
VDS=400V，ID=6A,L=318μH，
VGS=6V，Ron=10Ω，Roff=2Ω

Fig 23：Typ.Switching times waveform



Package Outline: DFN5*6





RECOMMENDED LAND PATTERN

SYMBOLS	DIMENSIONS MILLIMETERS		
	MIN	NOR	MAX
A	0.9	1.00	1.10
b	0.4	0.5	0.6
C	0.18	0.203	0.25
D	4.85	5	5.15
D1	4.16	4.31	4.46
E	5.85	6	6.15
e	1.27bsc		
L	0.55	0.7	0.85
L1	0.15	0.25	0.35
K	0.325	0.345	0.355
K1	1.70	1.90	2.10

Disclaimer

Any and all semicondutor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.

Unless otherwise specified in the datasheet, the product is designed and qulified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as automotive, aviation/aerospace and life-support devices or systems.
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