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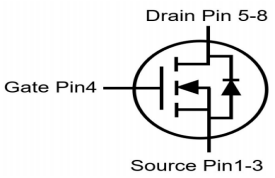
N-Channel Enhancement Mode Power MOSFET

MT Semiconductor®

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V_{DS}	60	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	0.9	mΩ
$I_{D(Silicon\ limited)}$	370	A

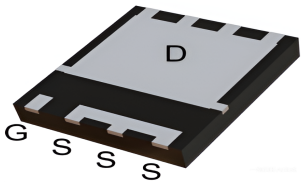
Simplified Schematic



Features

- Enhancement mode
- Ultra low RDS(on) to minimize conduction losses
- 100% Avalanche tested, 100% Rg tested
- Optimized Qg, Qgd, and Qgd/Qgs ratio to minimize switching losses

MARKING DIAGRAM & PIN ASSIGNMENT



TDFN5X6FL

Maximum ratings, at T_A =25°C, unless otherwise specified

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage		60	V
V_{GS}	Gate-source voltage		±20	V
I_S	Diode continuous forward current	T_C = 25°C	291	A
I_D	Continuous drain current @VGS=10V (Silicon limited)	T_C = 25°C	370	A
I_D	Continuous drain current @VGS=10V (Silicon limited)	T_C = 100°C	234	A
I_{DM}	Pulse drain current tested ①	T_C = 25°C	1150	A
I_{DSM}	Continuous drain current @VGS=10V	T_A = 25°C	35	A
		T_A = 70°C	28	A
EAS	Avalanche energy, single pulsed ②		1225	mJ
P_D	Maximum power dissipation ③	T_C = 25°C	291	W
		T_C = 100°C	116	W
P_{DSM}	Maximum power dissipation ④	T_A = 25°C	2.6	W
		T_A = 70°C	1.7	W
T_J,T_{STG}	Operating junction and storage temperature range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typical	Max	Unit
$R_{\theta JC}$	Thermal resistance, junction-to-case ⑤	0.36	0.43	°C/W
$R_{\theta JA}$	Thermal resistance, junction-to-ambient ⑥	40	48	°C/W

Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_j=25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS}=0V, I_D=250uA	60	--	--	V
I_{DSS}	Zero gate voltage drain current(Tj=25℃)	V_{DS}=60V,V_{GS}=0V	--	--	1	μA
	Zero gate voltage drain current(Tj=125℃)⑦	V_{DS}=60V,V_{GS}=0V	--	--	100	μA
I_{GSS}	Gate-body leakage current	V_{GS}=±20V,V_{DS}=0V	--	--	±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}=V_{GS},I_D=250μA	2.5	3.0	3.5	V
$R_{DS(on)}$	Drain-source on-state resistance ⑧	V_{GS}=10V, I_D=40A	--	0.9	1.2	mΩ
		(T_j=100℃)⑦	--	1.3	--	mΩ
G_{FS}	Forward transconductance	V_{DS}=5V, I_D=40A	--	94	--	S
Dynamic Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
Ciss	Input capacitance ⑦	V_{DS}=30V,V_{GS}=0V, f=100kHz	--	6235	--	pF
Coss	Output capacitance ⑦		--	1635	--	pF
Crss	Reverse transfer capacitance ⑦		--	75	--	pF
Rg	Gate resistance	f=1MHz	--	2.1	--	Ω
Qg	Total gate charge ⑦	V_{DS}=30V,I_D=40A, V_{GS}=10V	--	98	--	nC
Qgs	Gate-source charge ⑦		--	32	--	nC
Qgd	Gate-drain charge ⑦		--	24	--	nC
Switching Characteristics ⑦						
Td(on)	Turn-on delay time	V_{DD}=30V, I_D=40A, R_G=3Ω, V_{GS}=10V	--	20	--	ns
Tr	Turn-on rise time		--	72	--	ns
Td(off)	Turn-off delay time		--	59	--	ns
Tf	Turn-off fall time		--	36	--	ns
Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=40A,V_{GS}=0V	--	0.78	1	V
Trr	Reverse recovery time ⑦	V_{DD}=30V, I_{sd}=40A, V_{GS}=0V di/dt=100A/μs	--	63	--	ns
Qrr	Reverse recovery charge ⑦		--	73	--	nC

NOTE:

① Single pulse; pulse width ≤ 100μs.

② This value is based on starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} = 70A, V_{GS} =10V； 100% FT tested at L = 0.1mH, I_{AS} = 65A.

③ The power dissipation Pd is based on Tj(max), using junction-to-case thermal resistance RθJC.

④ The power dissipation Pdsm is based on Tj(max), using junction-to-ambient thermal resistance RθJA.

⑤ Thermal resistance from junction to soldering point (on the exposed drain pad). These tests are performed on a cold plate.

⑥ These tests are performed with the device mounted on 1 in2 FR-4 board with 2oz. Copper, in a still air environment with TA=25°C.

⑦ Guaranteed by design, not subject to production testing.

⑧ Pulse width ≤ 380μs; duty cycle≤ 2%.

Typical Characteristics

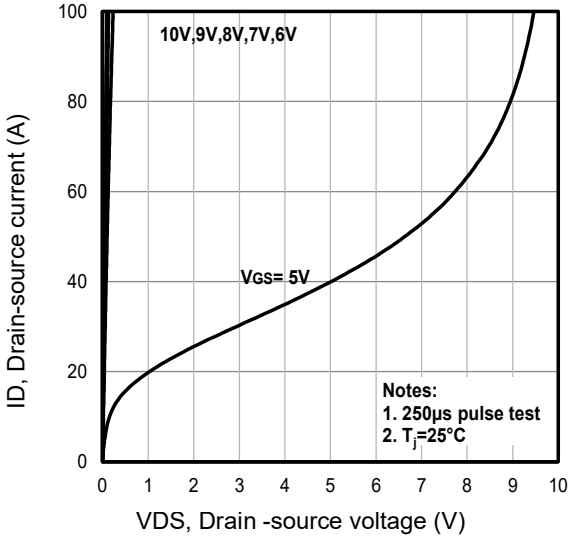


Fig1. Typical output characteristics

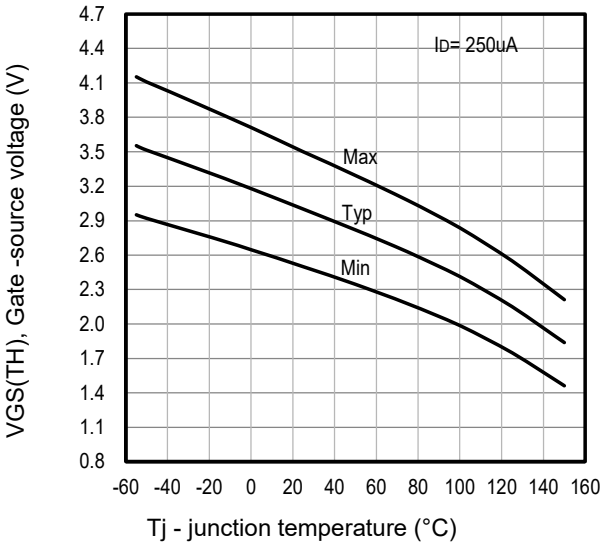


Fig2. Typical $V_{GS(TH)}$ gate -source voltage Vs. Tj

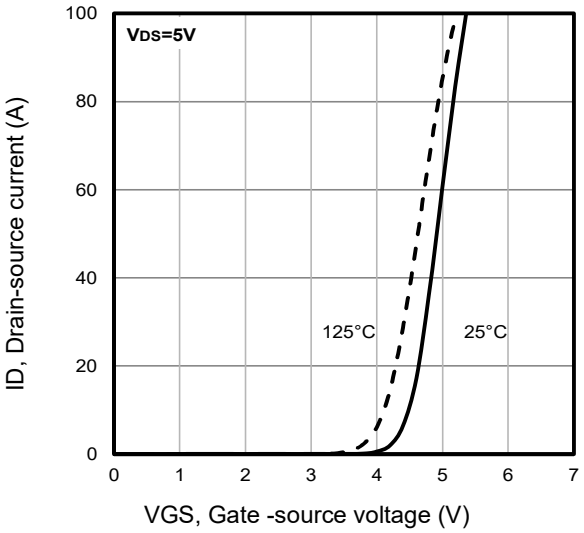


Fig3. Typical transfer characteristics

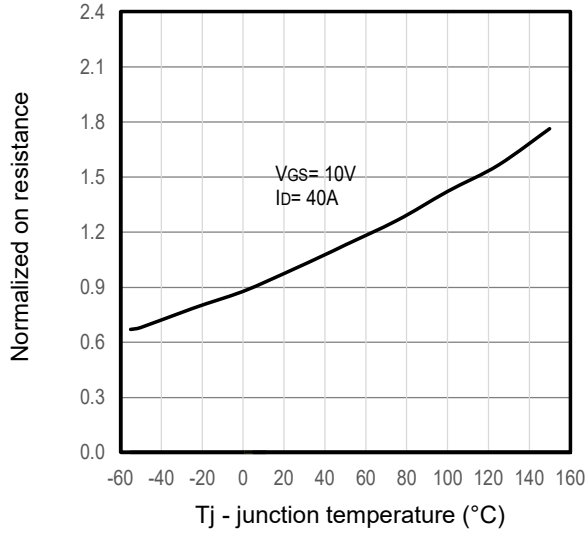


Fig4. Typical normalized on-resistance Vs. Tj

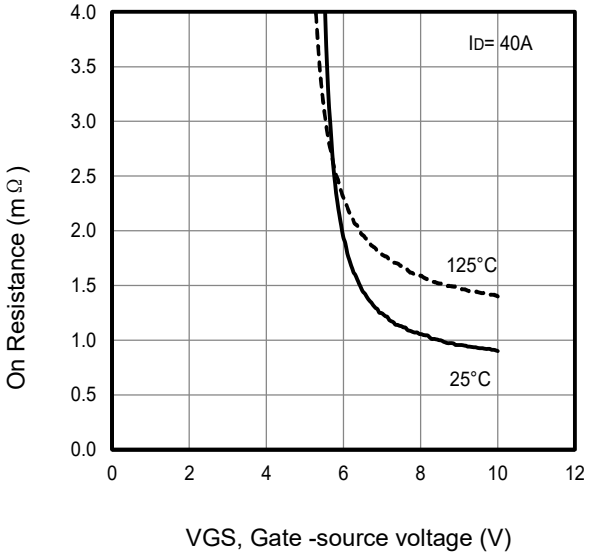


Fig5. Typical on resistance Vs gate -source voltage

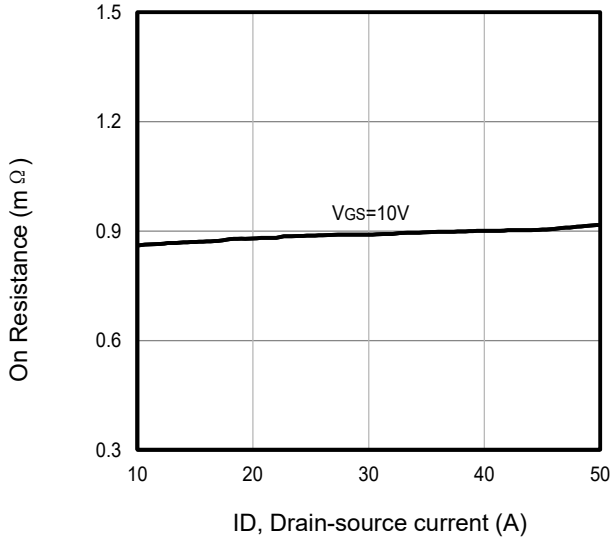


Fig6. Typical on resistance Vs drain current

Typical Characteristics

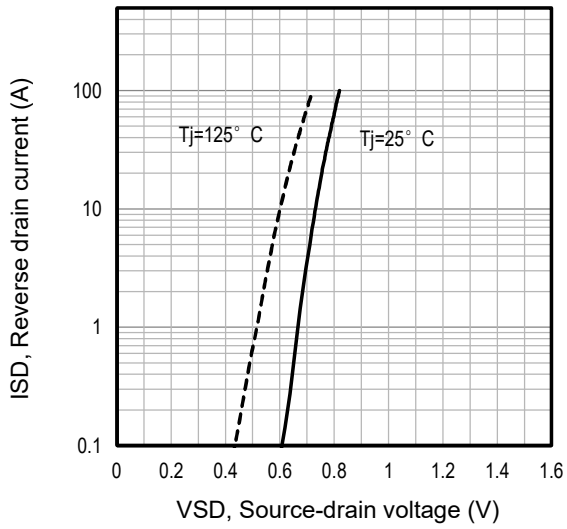


Fig7. Typical source-drain diode forward voltage

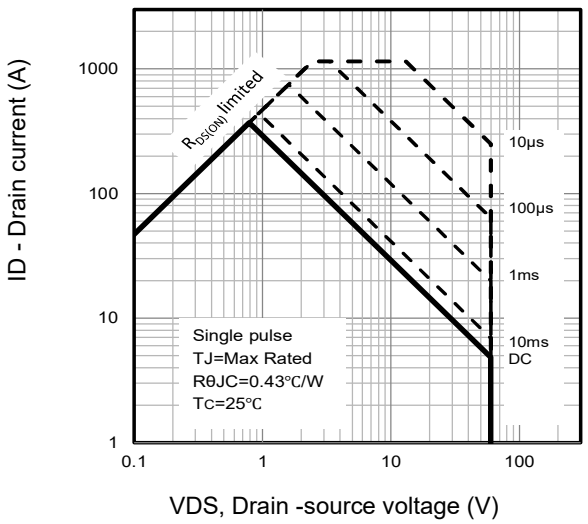


Fig8. Maximum safe operating area

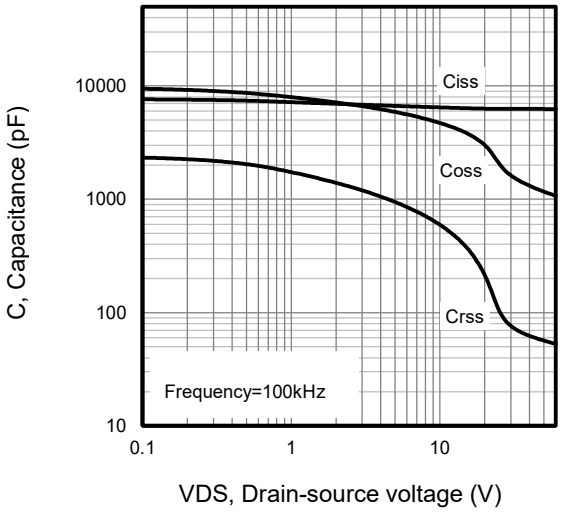


Fig9. Typical capacitance Vs. drain-source voltage

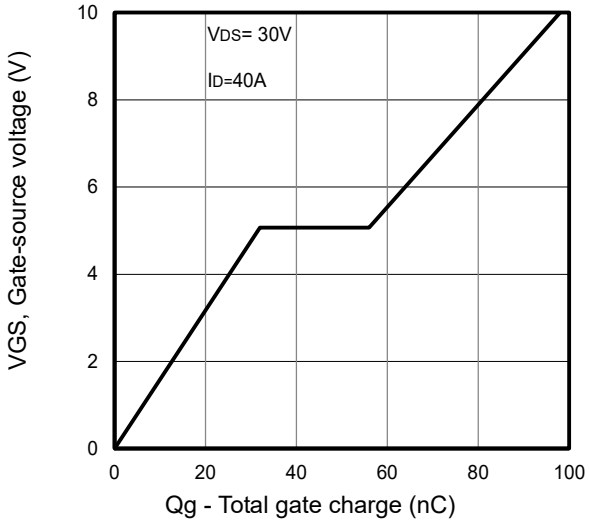


Fig10. Typical gate charge Vs. gate-source voltage

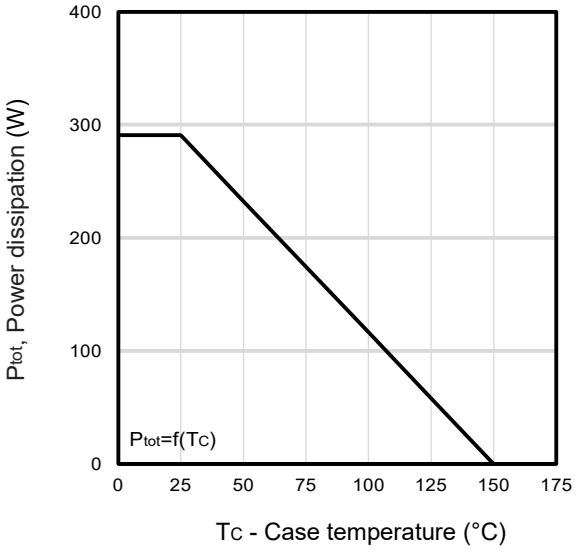


Fig11. Power dissipation Vs. case temperature

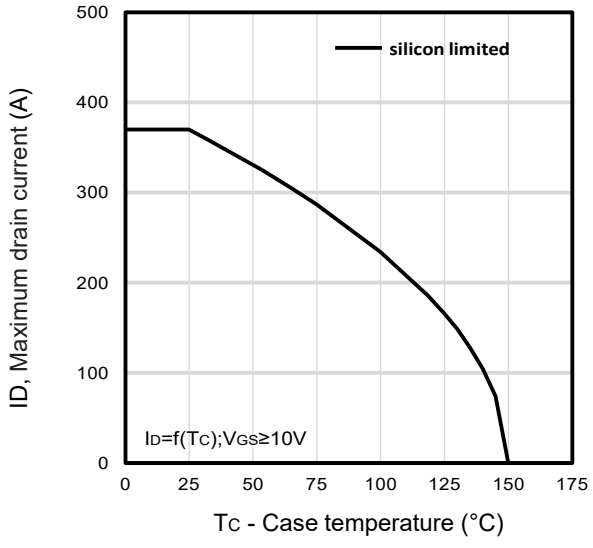


Fig12. Maximum drain current Vs. case temperature

Typical Characteristics

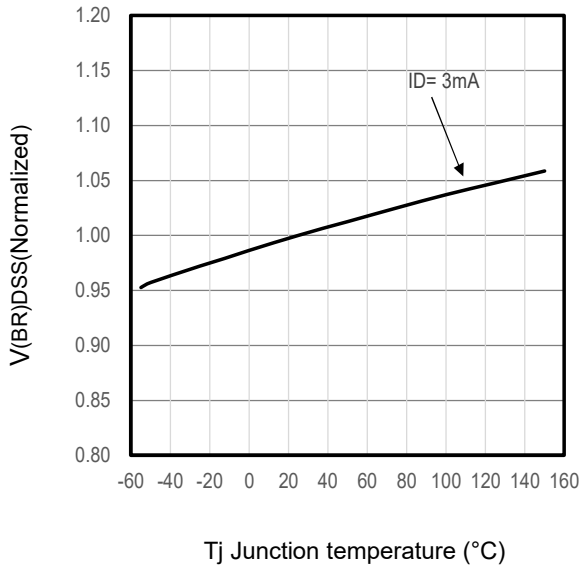


Fig13. Typical $V_{(BR)DSS}$ Vs Tj

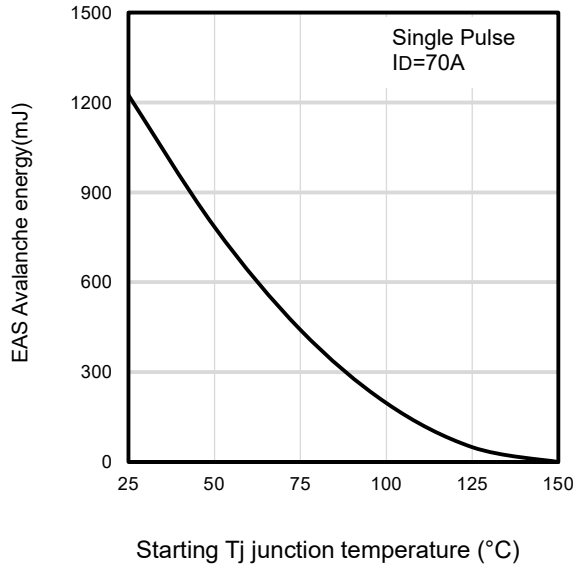


Fig14. Maximum avalanche energy vs temperature (°C)

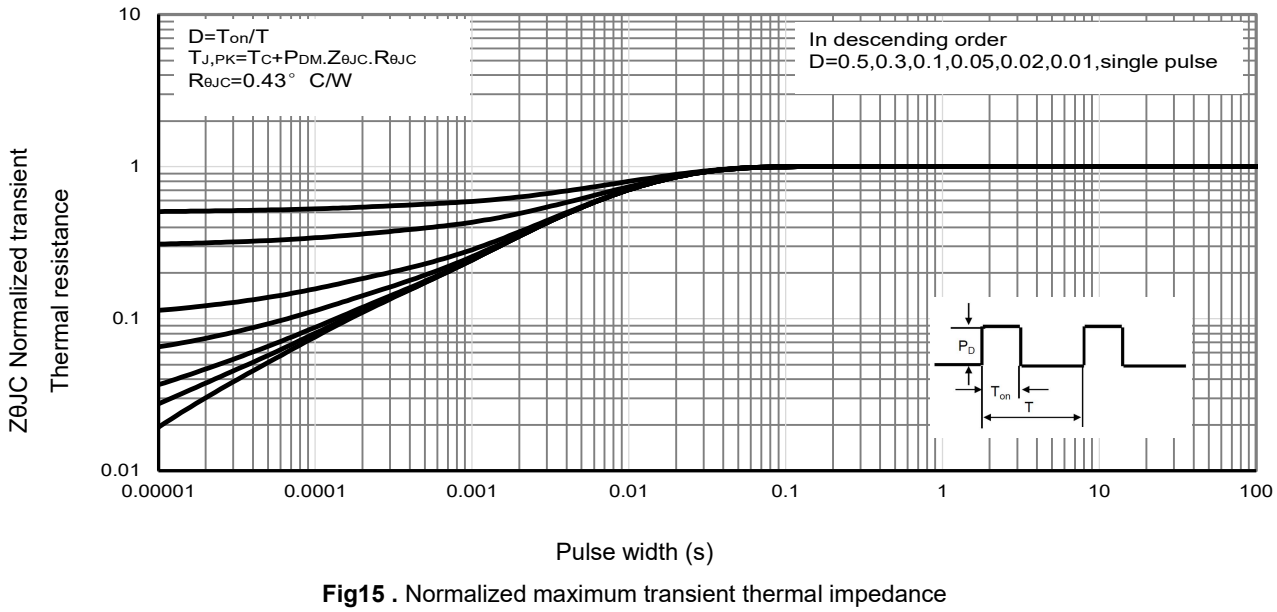


Fig15 . Normalized maximum transient thermal impedance

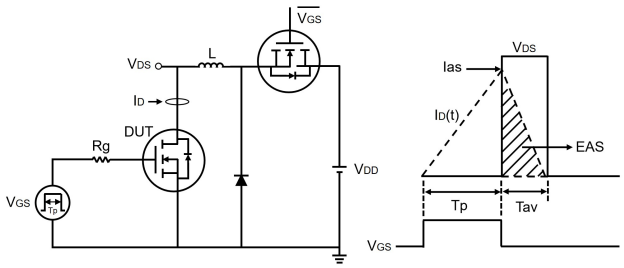


Fig16. Unclamped Inductive Test Circuit and waveforms

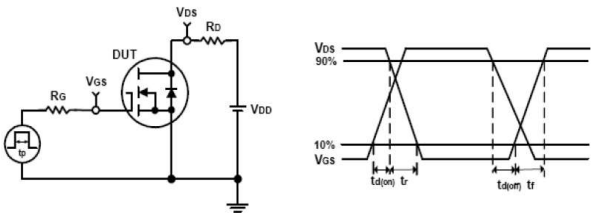
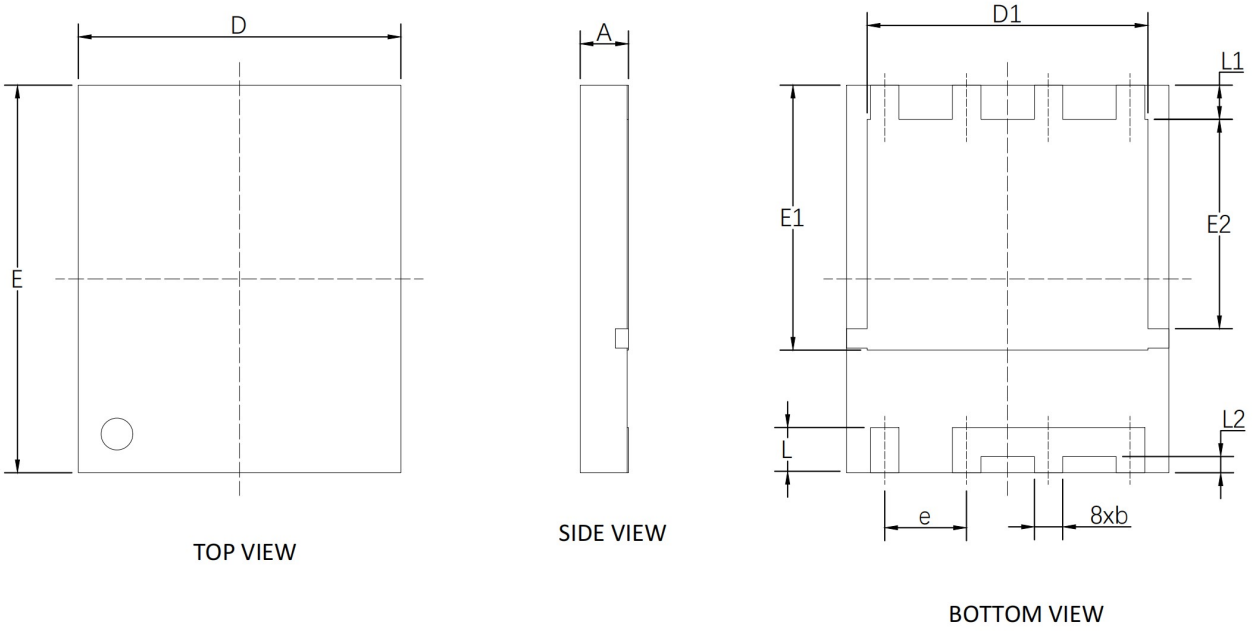
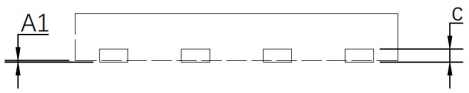


Fig17. Switching Time Test Circuit and waveforms

TDFN5x6FL Package Outline Data





Symbol	DIMENSIONS (unit : mm)		
	Min	Typ	Max
A	0.90	1.00	1.10
A1	0.00	0.02	0.05
b	0.34	0.44	0.54
c	0.203 REF.		
D	4.90	5.00	5.10
D1	4.25	4.35	4.45
E	5.90	6.00	6.10
E1	4.00	4.10	4.20
E2	3.14	3.24	3.34
e	1.27 BSC		
L	0.60	0.70	0.80
L1	0.43	0.53	0.63
L2	0.25 REF.		

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