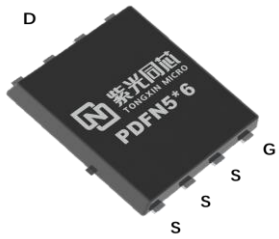
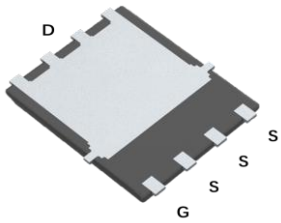
THF012S60LKN1A
Datasheet

Product Summary

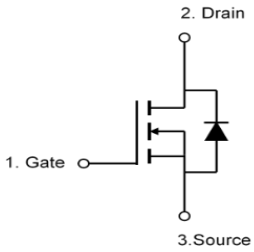
Parameter	Value	Unit
V_{DS}	60	V
$V_{GS(th)\_Typ}$	1.7	V
I_D (@ V_{GS} = 10V) (1)	36	A
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 10V)	10.0	mΩ



Features



- Fast Switching
- Very low on-resistance
- Enhancement mode
- 100% Avalache Tested
- 100% ΔVds Tested
- Halogen-free and RoHS-compliant
- Humidity Sensitivity Class: MSL1



Typical Applications

- Load Switch
- PWM Application
- Power Management

RoHS PB Pb-free HF Halogen-free

Product Validation

- Qualified for Automotive Applications. Product validation according to AEC-Q101

Ordering Information

Device	Package	Quantity of Pins	Marking	MSL	T_J (°C)
THF012S60LKN1A	PDFN5x6-8L	8	012S60LKN1A	1	-55 to 175

Absolute Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DS}	60	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (1)	T_C = 25°C	I_D	36	A
	T_C = 100°C		25	A
Pulsed Drain Current (2)		I_{DM}	142	A
Avalanche Current (3)		I_{AS}	15	A
Avalanche Energy (3)		E_{AS}	178	mJ
Power Dissipation (4)	T_C = 25°C	P_D	31	W
	T_C = 100°C		16	W
Junction & Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

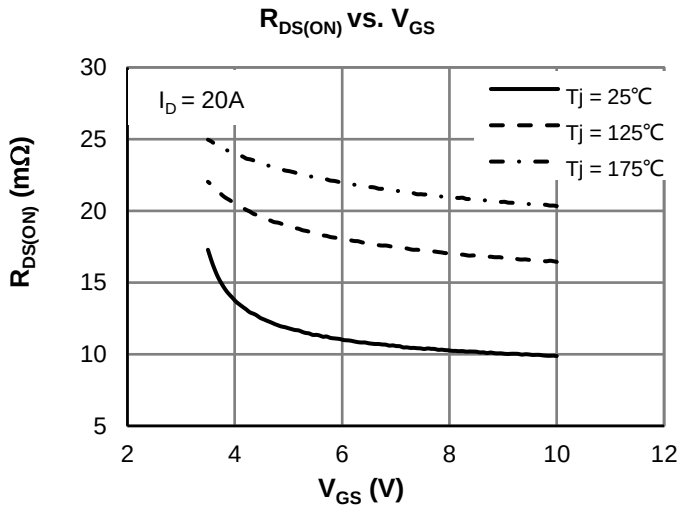


Figure 1: $R_{DS(ON)}$ VS. V_{GS}

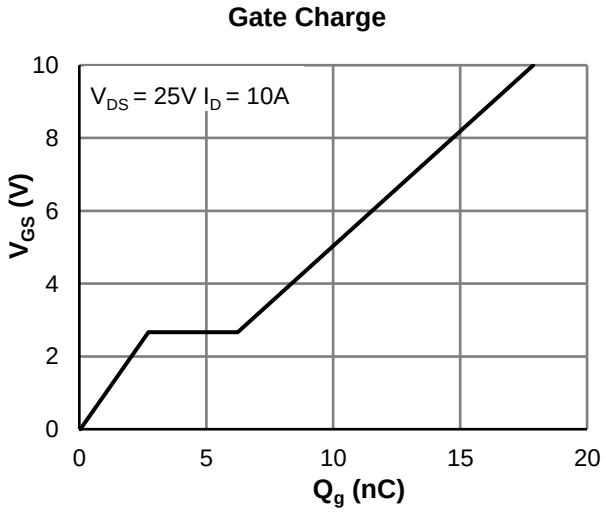


Figure 2: Gate Charge Curve

Electrical Characteristics (@ T_J = 25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 250μA, V_{GS} = 0V	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 60V, V_{GS} = 0V	-	-	1.0	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.7	2.5	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 20A	-	10.0	12.0	mΩ
		V_{GS} = 4.5V, I_D = 20A	-	12.6	15.1	
Diode Forward Voltage	V_{SD}	I_S = 20A, V_{GS} = 0V	-	0.7	1.0	V
Diode Continuous Current	I_S	T_C = 25°C	-	-	45	A
DYNAMIC PARAMETERS (5)						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz	-	1080	-	pF
Output Capacitance	C_{oss}		-	194	-	pF
Reverse Transfer Capacitance	C_{rss}		-	6	-	pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz	-	1.5	-	Ω
SWITCHING PARAMETERS (5)						
Total Gate Charge (@ V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V, V_{DS} = 30V, I_D = 20A	-	18	-	nC
Gate Source Charge	Q_{gs}		-	3.0	-	nC
Gate Drain Charge	Q_{gd}		-	4.0	-	nC
Turn-On DelayTime	$t_{D(on)}$	V_{GS} = 10V, V_{DS} = 30V, R_L = 1.5Ω, R_{GEN} = 6Ω	-	20.1	-	ns
Turn-On Rise Time	t_r		-	22.0	-	ns
Turn-Off DelayTime	$t_{D(off)}$		-	1.8	-	ns
Turn-Off Fall Time	t_f		-	5.4	-	ns
Body Diode Reverse Recovery Time	t_{rr}	I_F = 15A, dI_F/dt = 100A/μs	-	29.8	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	34.8	-	nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	45	54	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.0	4.8	°C/W

Notes:

1. *Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.*
2. *This single-pulse measurement was taken under T_{J_Max} .*
3. *This single-pulse measurement was taken under the following condition [L = 0.3mH, V_{GS} = 10V, V_{DS} = 50V] while its value is limited by T_{J_Max} .*
4. *The power dissipation P_D is based on T_{J_Max} .*
5. *This value is guaranteed by design hence it is not included in the production test.*

Typical Electrical & Thermal Characteristics

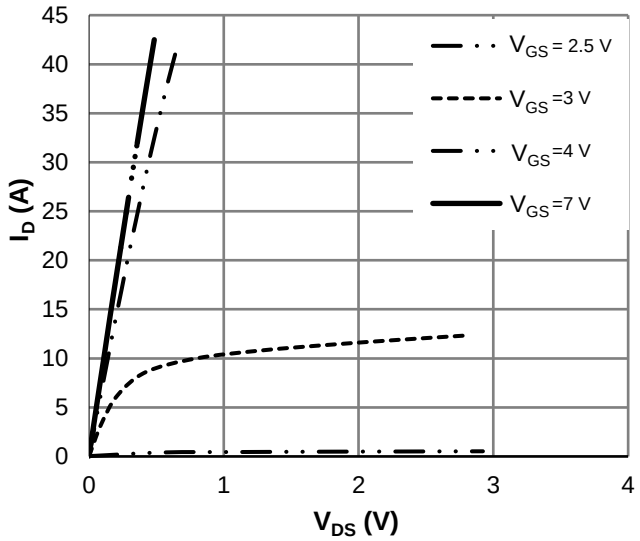


Figure 3: Saturation Characteristics

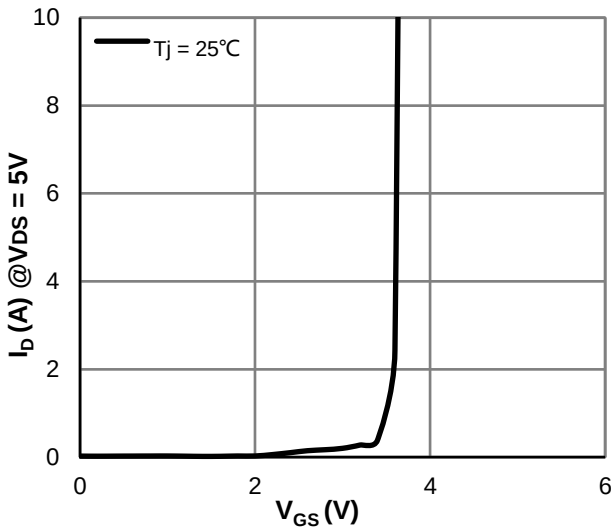


Figure 4: Transfer Characteristics

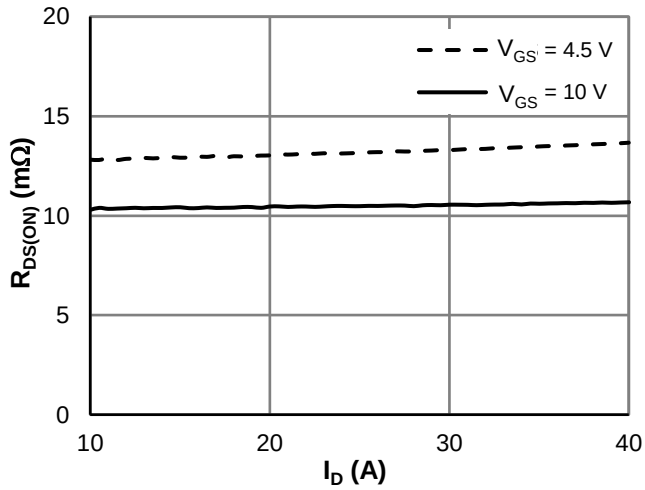


Figure 5: RDS(ON) vs. Drain Current

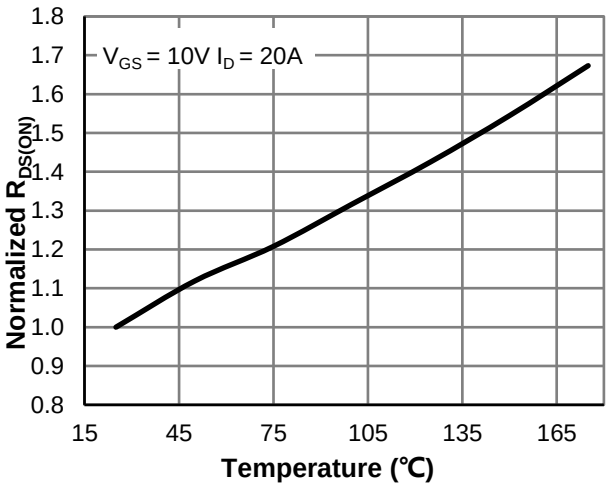


Figure 6: RDS(ON) vs. Junction Temperature

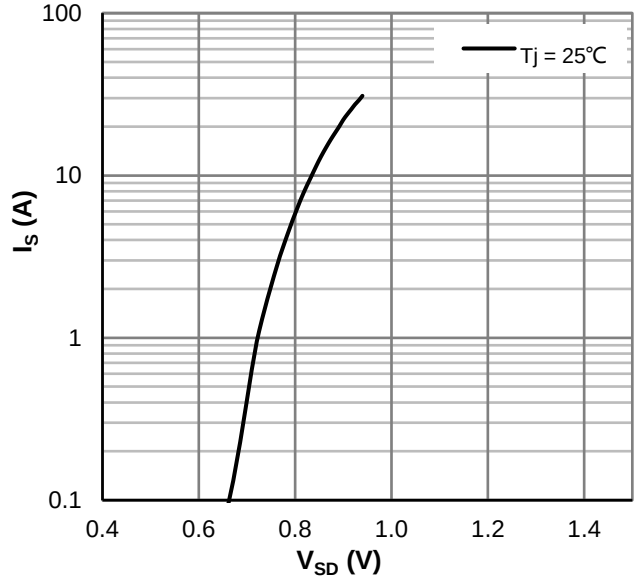


Figure 7: Body-Diode Characteristics

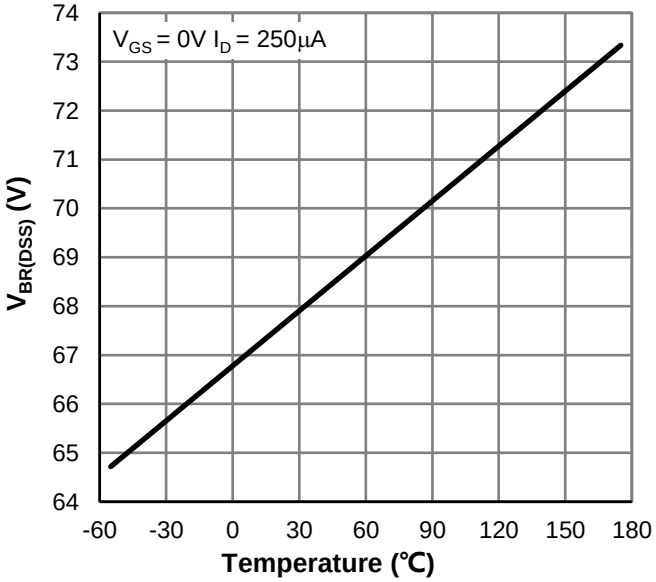


Figure 8: $V_{BR(DSS)}$ vs. Junction Temperature

Typical Electrical & Thermal Characteristics

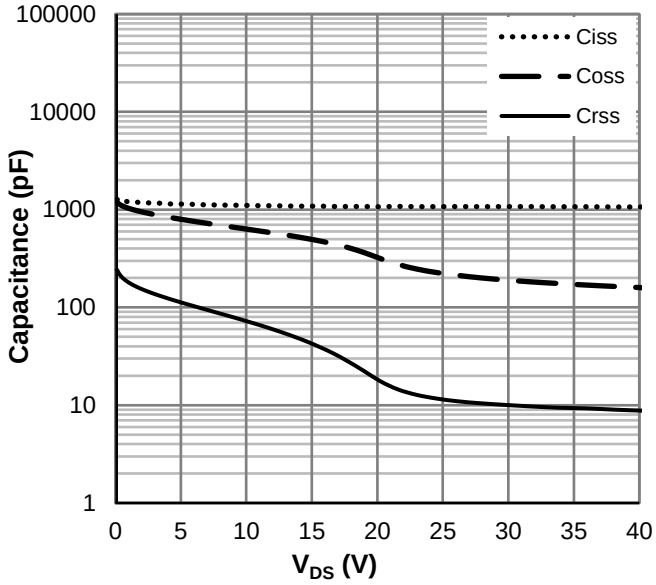


Figure 9: Capacitance Characteristics

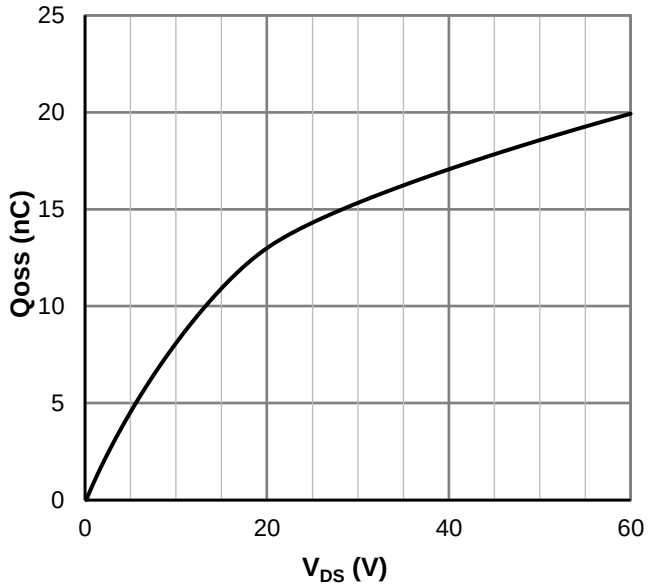


Figure 10: Coss Stored Energy

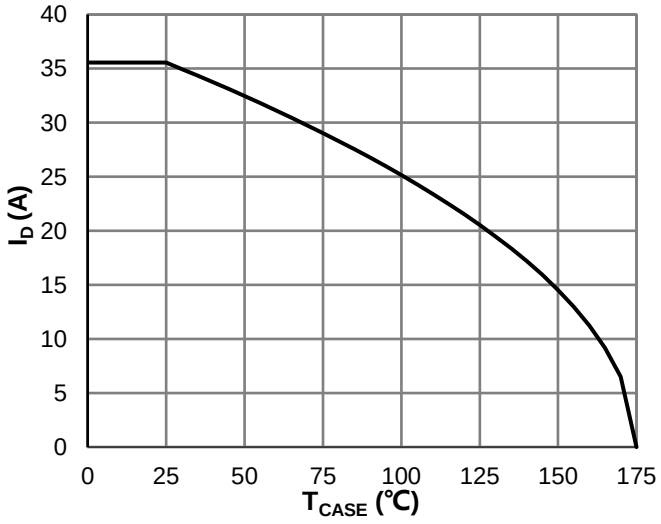


Figure 11: Current De-rating

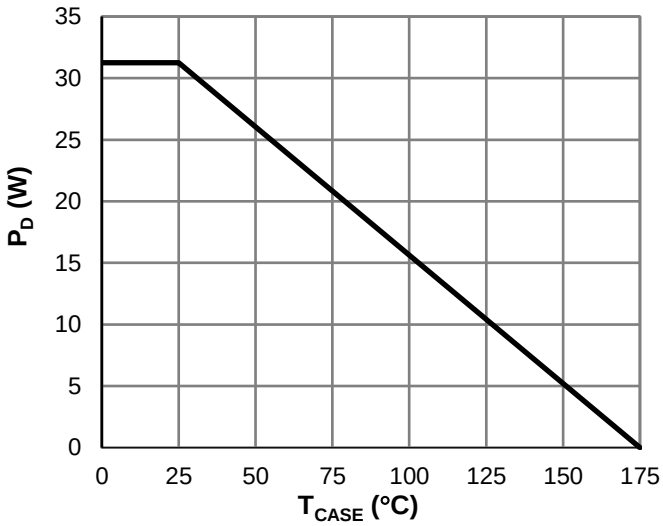


Figure 12: Power De-rating

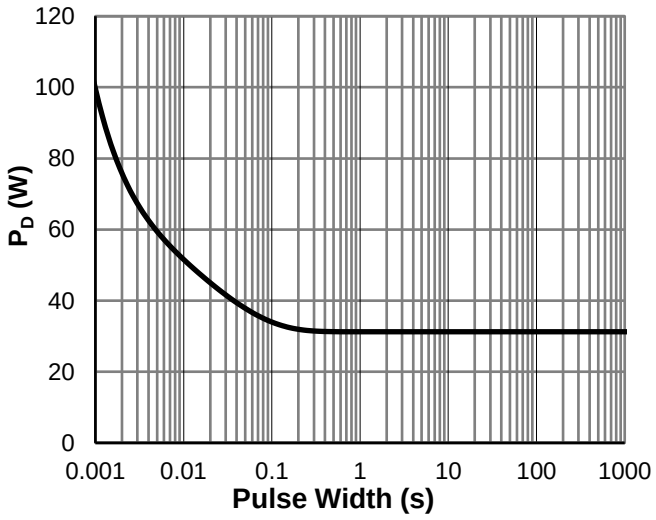


Figure 13: Single Pulse Power Rating, Junction-to-Case

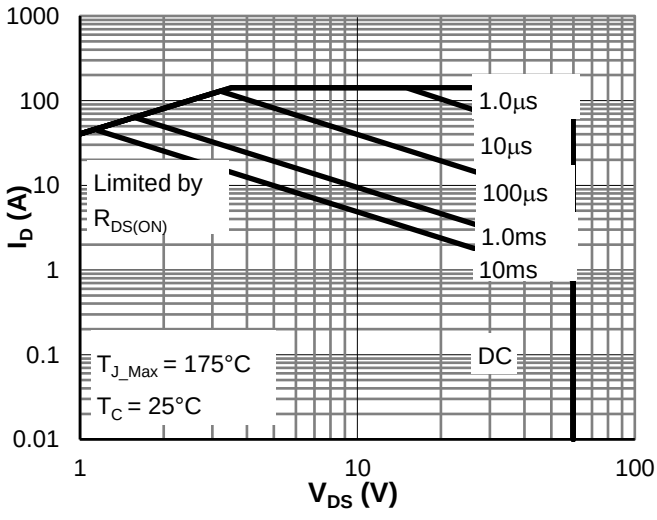


Figure 14: Maximum Safe Operating Area

Typical Electrical & Thermal Characteristics

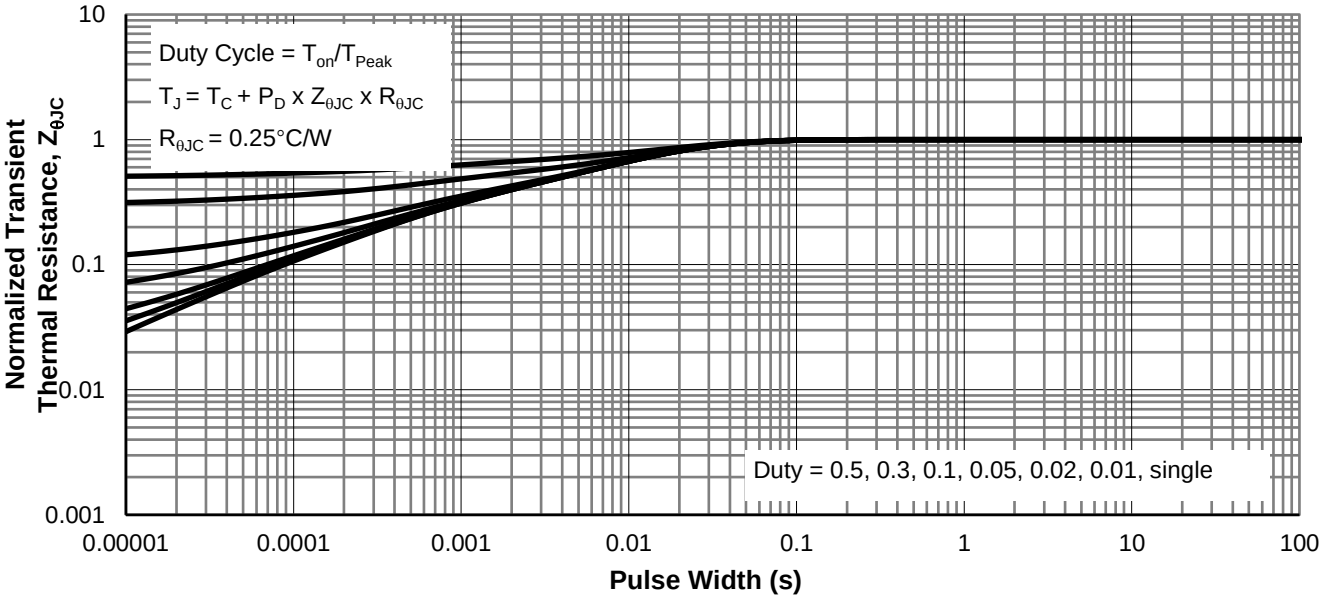
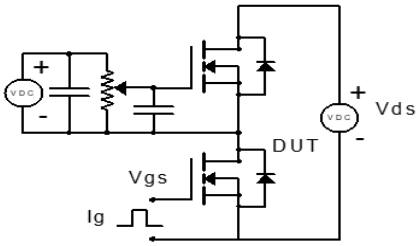
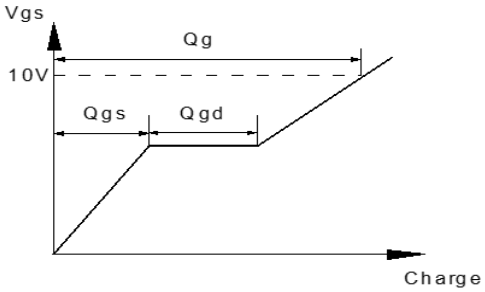


Figure 15: Normalized Maximum Transient Thermal Impedance

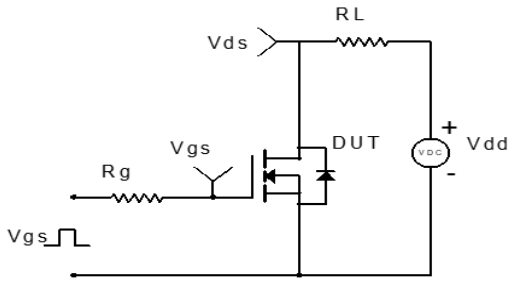
Test Condition

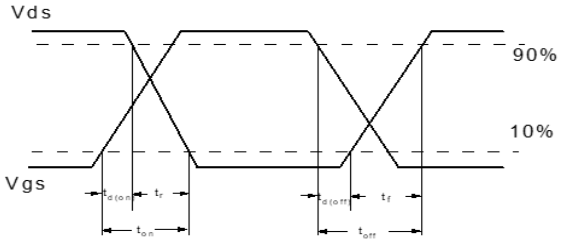
Gate Charge Test Circuit & Wave Form



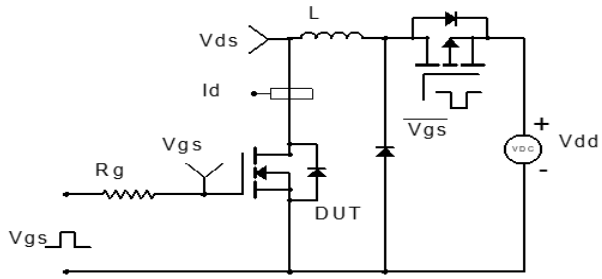


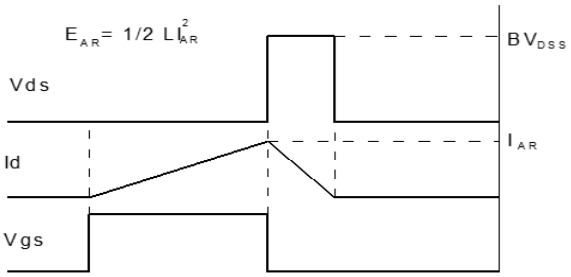
Resistive Switching Test Circuit & Wave Form



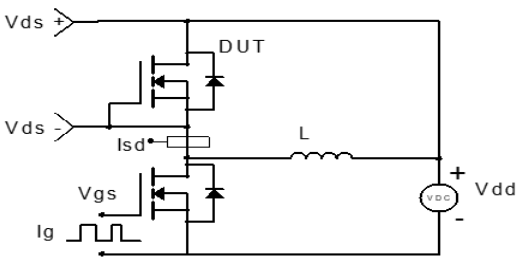


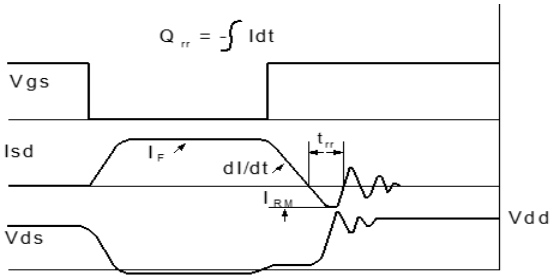
Unclamped Inductive Switching(UIS)





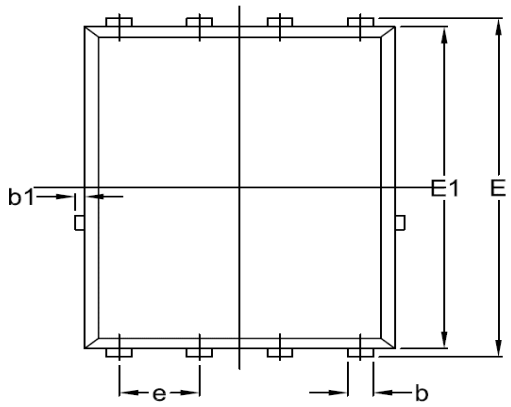
Diode Recovery Test Curcuit & Wave Form

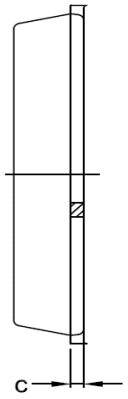


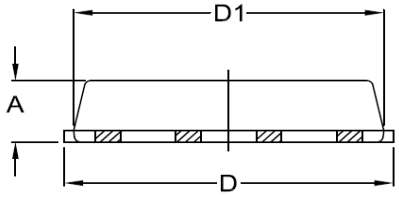


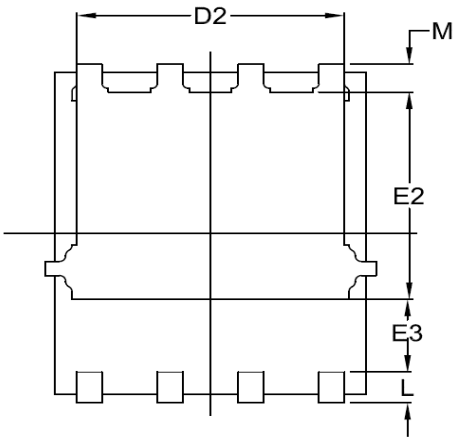
Package Outlines

Package Drawing PDFN5*6









DIM	MILLIMETERS		
	MIN	NOM	MAX
A	1.00	1.10	1.20
b	0.30	0.40	0.50
b1	0.02	0.15	0.22
c	0.15	0.20	0.35
D	4.95	5.15	5.35
D1	4.80	4.90	5.00
D2	4.00	4.20	4.40
E	5.95	6.05	6.25
E1	5.65	5.75	5.85
E2	3.50	3.70	3.90
E3	1.10	/	/
e		1.27	
L	0.40	0.55	0.70
M	0.35	0.50	0.65

Contact US

Home Page: https://www.tsinghuaic.com
Address: 106A F/1, Building B-1, Zhongguancun Dongsheng Technology Park Northern Territory, No.66 Xixiaokou Road, Haidian District, Beijing
Phone: +86-10-82351818-310

Business1
Phone: +86-10-82351818-376
E-mail: sales2@tsinghuaic.com

Revision History

Version	Change Description
V1.0	initial version