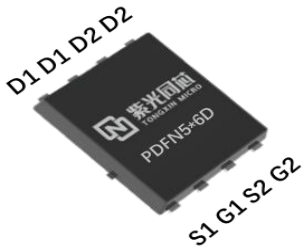
THF6D0S40HNN1A
Datasheet

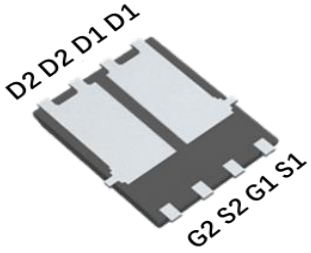
Product Summary

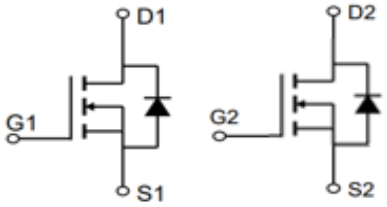
Parameter	Value	Unit
V_{DS}	40	V
$V_{GS(th)\_Typ}$	3	V
I_D (@ V_{GS} = 10V) (1)	62	A
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 10V)	5.0	mΩ



Features

- High Speed Power Switching
- Enhanced Body diode dv/dt capability
- 100% UIS Tested, 100% R_g Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant
- Humidity Sensitivity Class：MSL1





Typical Applications

- Load Switch
- Hard Switching and High Speed Circuit
- Uninterruptible power supply
- Automotive Applications

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)
THF6D0S40HNN1A	PDFN5x6-8L-D	8	6D0S40HNN	1	-55 to 175

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

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DS}	40	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (1)	T_C = 25°C	I_D	62	A
	T_C = 100°C		45	A
Pulsed Drain Current (2)		I_{DM}	248	A
Avalanche Current (3)		I_{AS}	36	A
Avalanche Energy (3)		E_{AS}	65	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

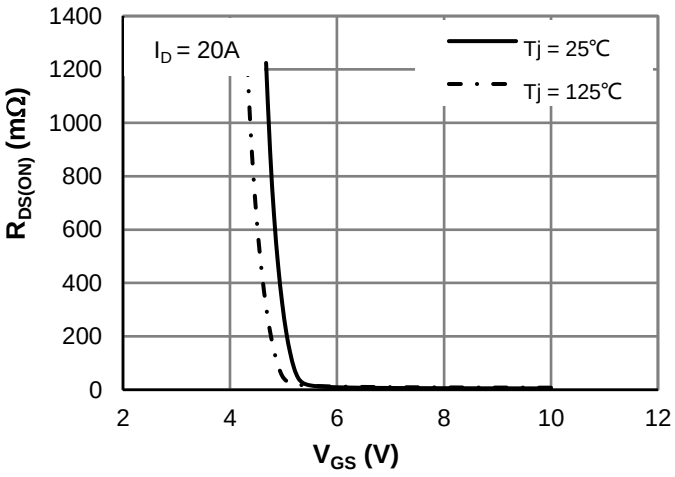


Figure 1: $R_{DS(ON)}$ VS. V_{GS}

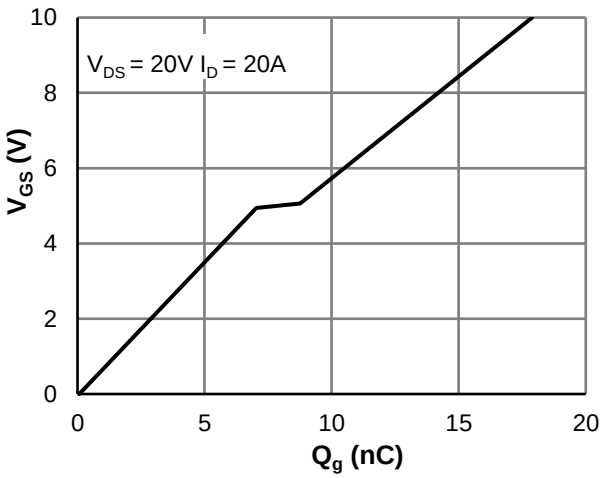


Figure 2: Gate Charge Curve

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	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40V, 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	2.2	3.0	3.8	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 20A	-	5.0	6.0	mΩ
Diode Forward Voltage	V_{SD}	I_S = 20A, V_{GS} = 0V	-	0.9	1.1	V
Diode Continuous Current	I_S	T_C = 25°C	-	-	34	A
DYNAMIC PARAMETERS (5)						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz	-	1360	-	pF
Output Capacitance	C_{oss}		-	612	-	pF
Reverse Transfer Capacitance	C_{rss}		-	27	-	pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz	-	2.2	-	Ω
SWITCHING PARAMETERS (5)						
Total Gate Charge (@ V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V, V_{DS} = 20V, I_D = 20A	-	20	-	nC
Gate Source Charge	Q_{gs}		-	6.7	-	nC
Gate Drain Charge	Q_{gd}		-	4.4	-	nC
Turn-On DelayTime	$t_{D(on)}$	V_{GS} = 10V, V_{DS} = 20V, I_D = 20A, R_{GEN} = 3Ω	-	3.8	-	ns
Turn-On Rise Time	t_r		-	10	-	ns
Turn-Off DelayTime	$t_{D(off)}$		-	2	-	ns
Turn-Off Fall Time	t_f		-	4	-	ns
Body Diode Reverse Recovery Time	t_{rr}	I_F = 20A, dI_F/dt = 108A/μs	-	27	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	20.0	-	nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	47	56	°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 = 0.1mH, V_{GS} = 10V, V_{DS} = 20V] 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

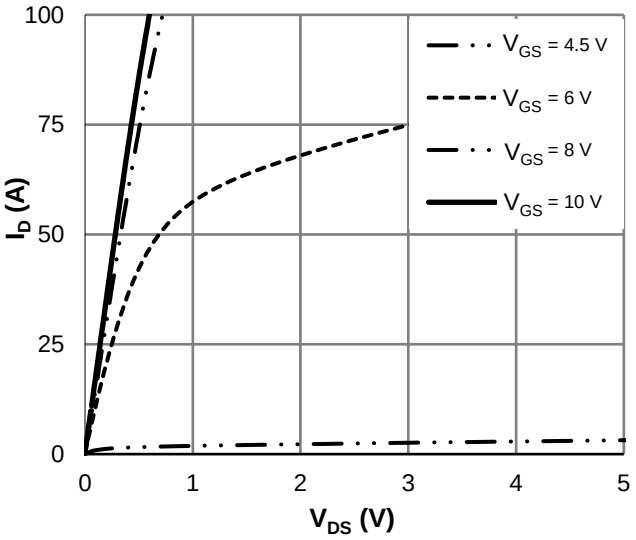


Figure 3: Saturation Characteristics

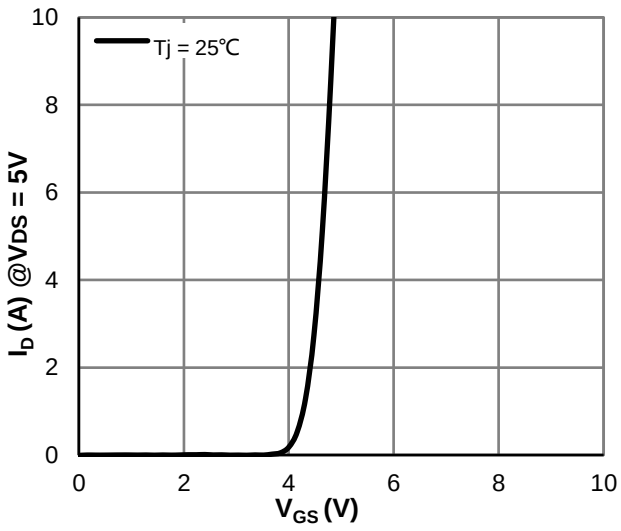


Figure 4: Transfer Characteristics

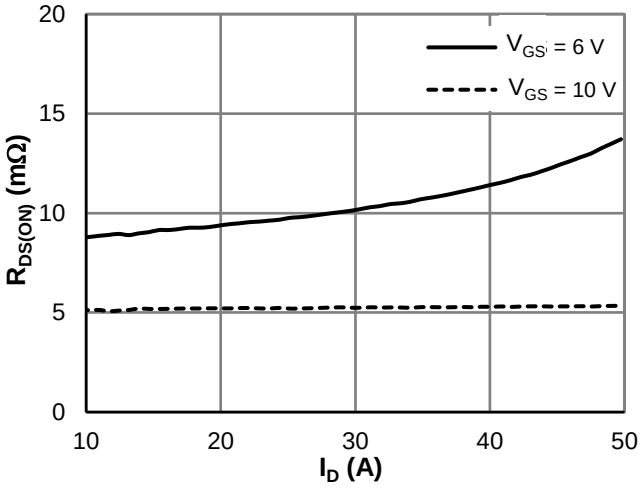


Figure 5: RDS(ON) vs. Drain Current

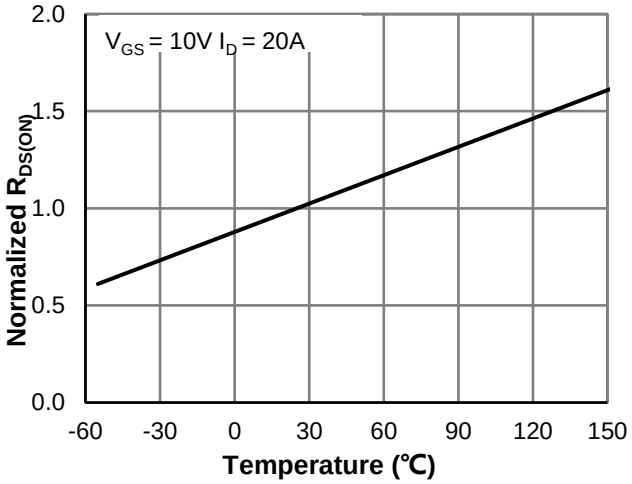


Figure 6: RDS(ON) vs. Junction Temperature

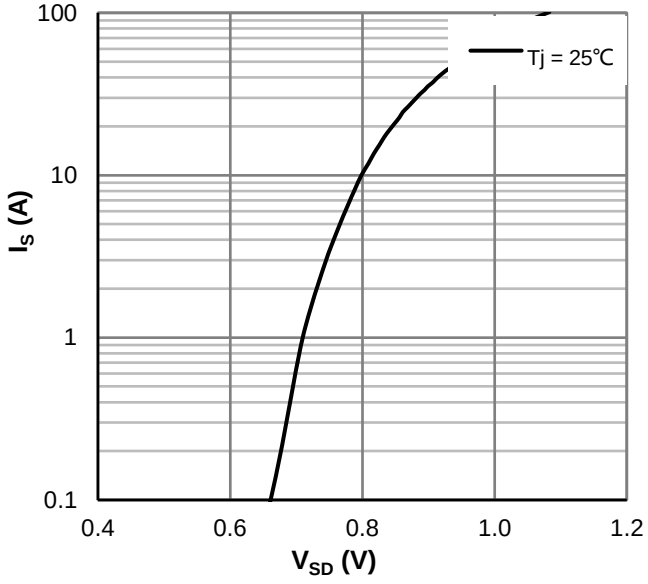


Figure 7: Body-Diode Characteristics

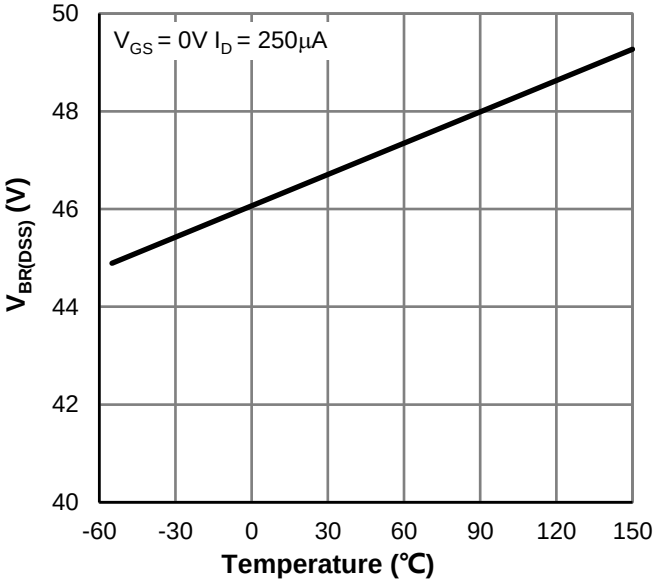


Figure 8: $V_{BR(DSS)}$ vs. Junction Temperature

Typical Electrical & Thermal Characteristics

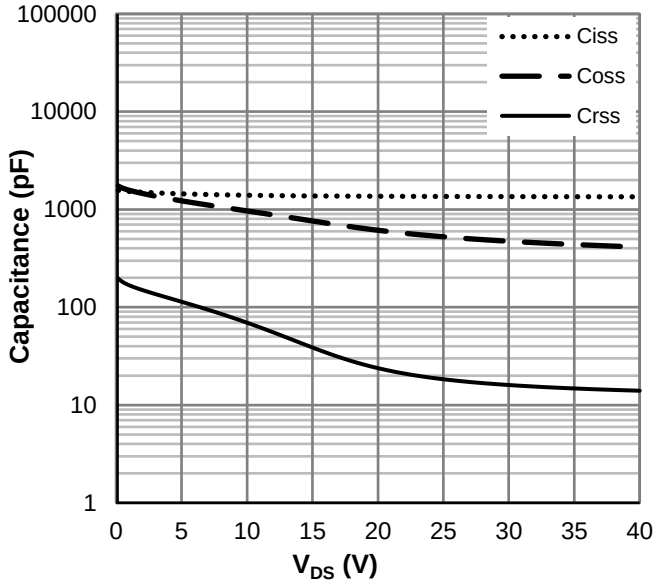


Figure 9: Capacitance Characteristics

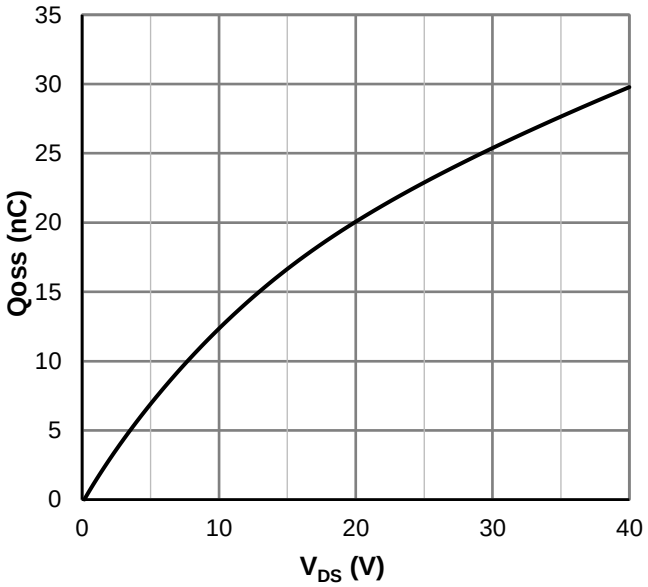


Figure 10: Coss Stored Energy

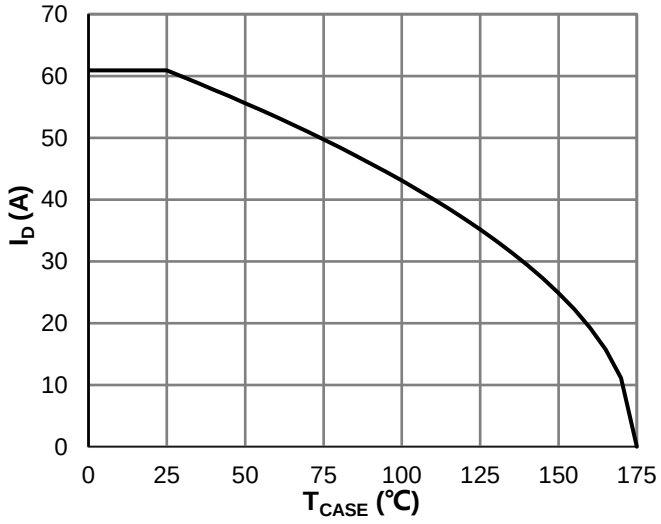


Figure 11: Current De-rating

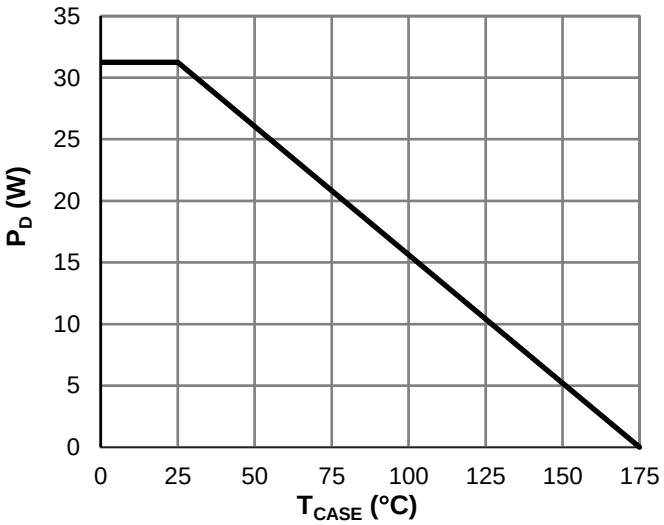


Figure 12: Power De-rating

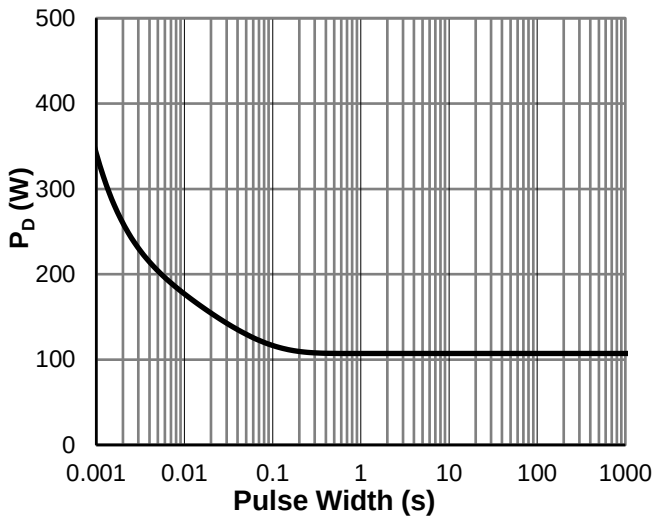


Figure 13: Single Pulse Power Rating, Junction-to-Case

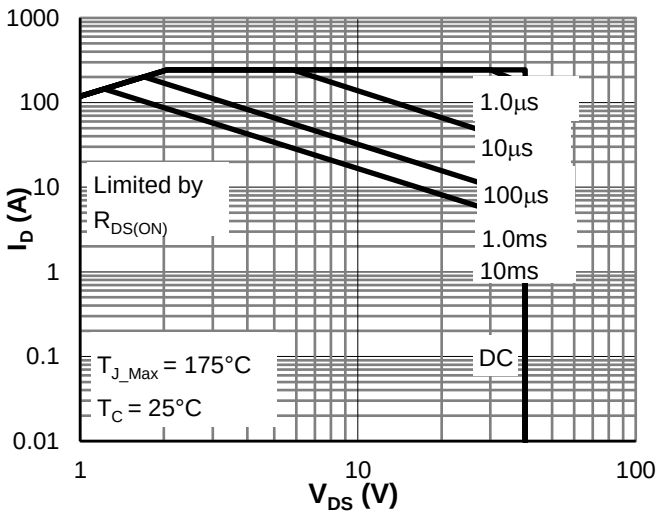


Figure 14: Maximum Safe Operating Area

Typical Electrical & Thermal Characteristics

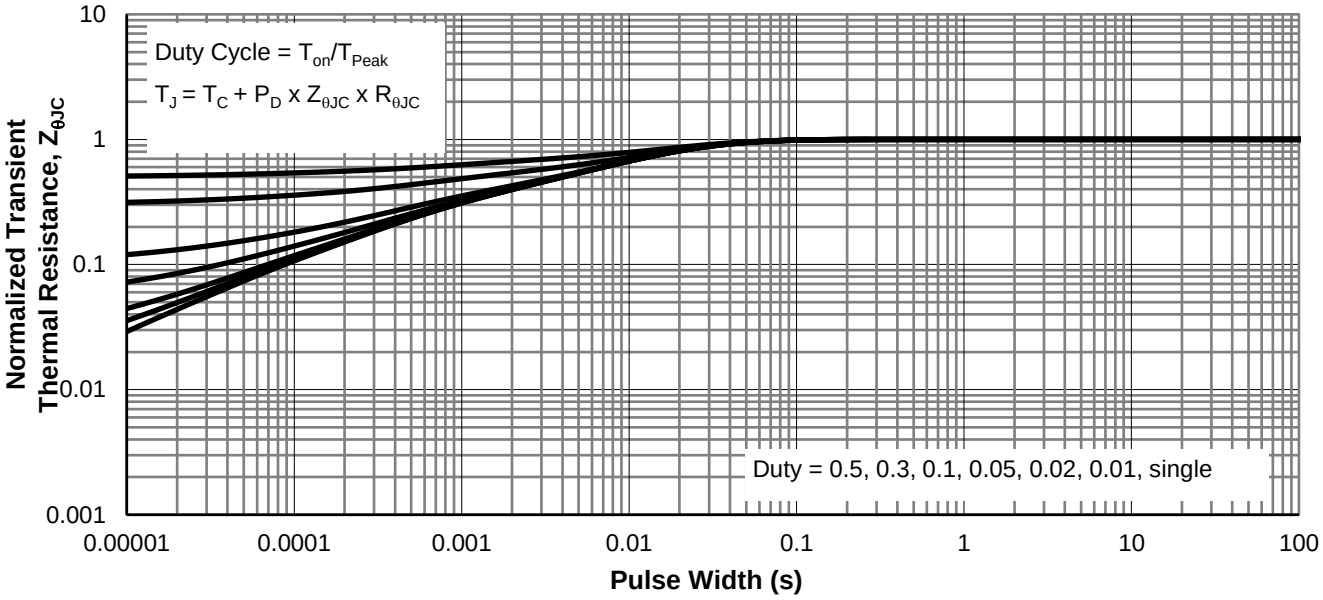
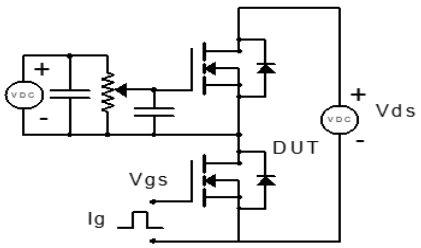
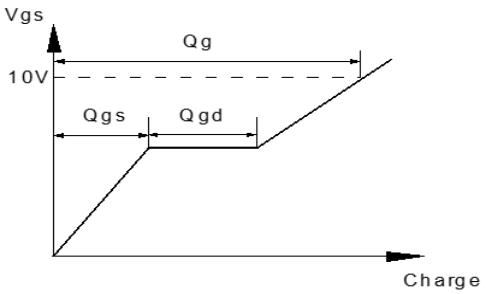


Figure 15: Normalized Maximum Transient Thermal Impedance

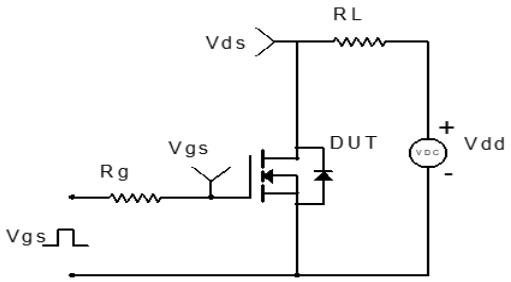
Test Condition

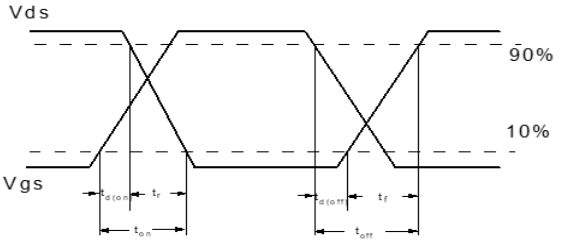
Gate Charge Test Circuit & Wave Form



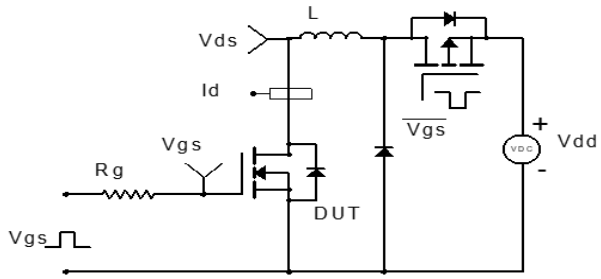


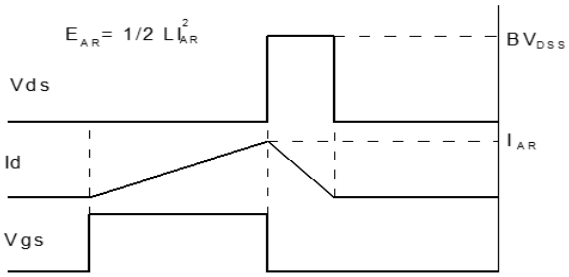
Resistive Switching Test Circuit & Wave Form



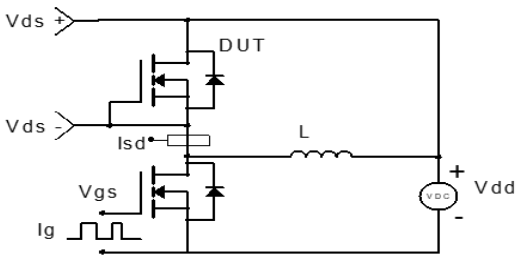


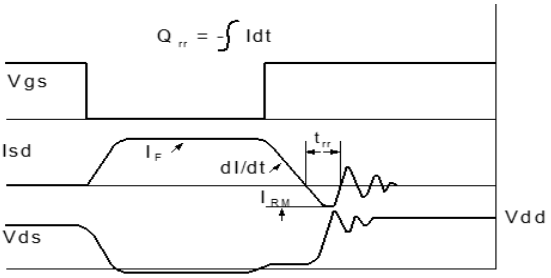
Unclamped Inductive Switching(UIS)





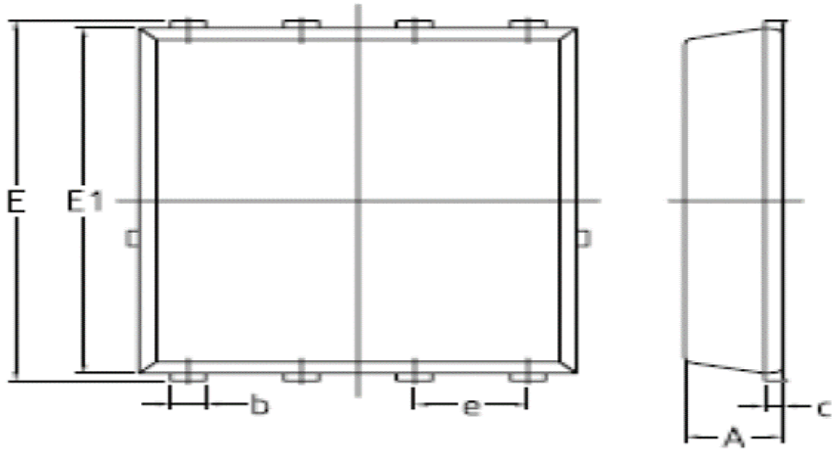
Diode Recovery Test Curcuit & Wave Form

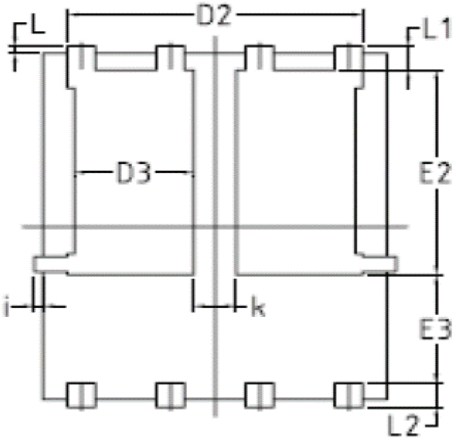


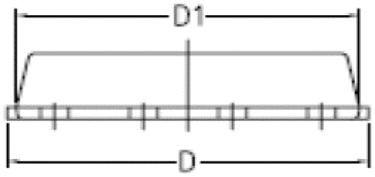


Package Outlines

Package Drawing PDFN5*6D







DIM	MILLIMETERS		
	MIN	NOM	MAX
A	1.03	–	1.17
A1	0.34	–	0.48
c	0.203BSC		
D	4.80	–	5.40
D1	4.80	–	5.00
D2	4.11	–	4.31
D3	1.60	–	1.80
E	5.95	–	6.15
E1	5.65	–	5.85
E2	3.30	–	3.50
E3	1.70	–	–
e	1.27 BSC		
L	0.05	–	0.25
L1	0.38	–	0.50
L2	0.38	–	0.50
i	–	–	0.18
k	0.50	–	0.70

Contact US

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Revision History

Version	date	Change Description
V1.0	2025/7/30	initial version