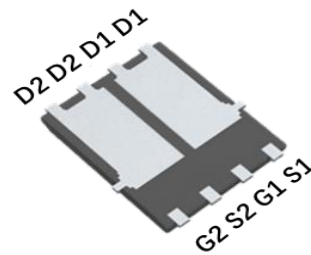


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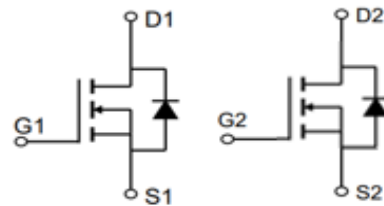
Product Summary

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	m Ω



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



Product Validation

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

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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⁾	I _D	T _C = 25°C	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⁾	P _D	T _C = 25°C	31 W
		T _C = 100°C	16 W
Junction & Storage Temperature Range	T _J , T _{STG}	-55 to 175	°C

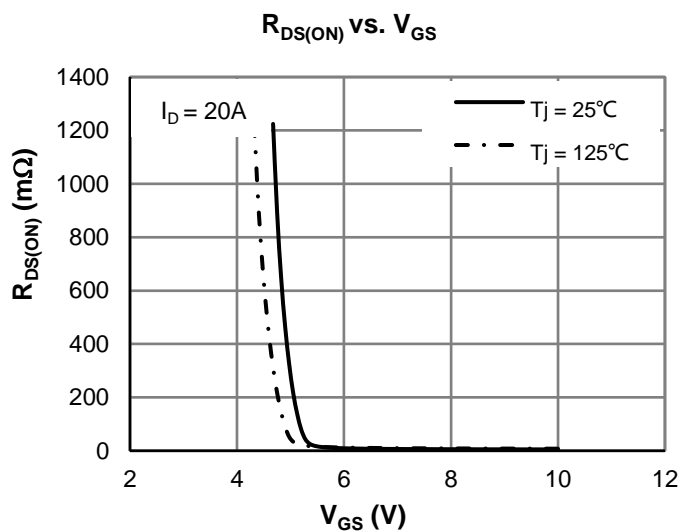


Figure 1: R_{DS(ON)} VS. V_{GS}

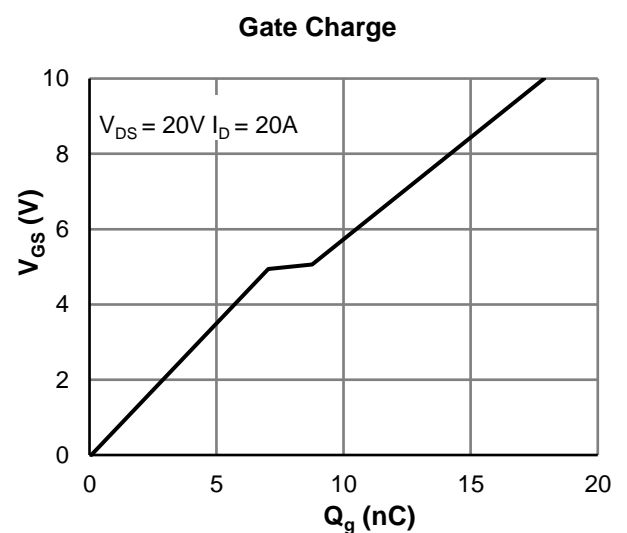


Figure 2: Gate Charge Curve

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Electrical Characteristics (@ $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$	-	-	1.0	μA
Gate-Body Leakage Current	I_{GSS}	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 20\text{V}$	-	-	100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	2.2	3.0	3.8	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}$, $I_D = 20\text{A}$	-	5.0	6.0	m Ω
Diode Forward Voltage	V_{SD}	$I_S = 20\text{A}$, $V_{GS} = 0\text{V}$	-	0.9	1.1	V
Diode Continuous Current	I_S	$T_C = 25^\circ\text{C}$	-	-	34	A
DYNAMIC PARAMETERS ⁽⁵⁾						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{V}$, $V_{DS} = 20\text{V}$, $f = 1\text{MHz}$	-	1360	-	pF
Output Capacitance	C_{oss}		-	612	-	pF
Reverse Transfer Capacitance	C_{rss}		-	27	-	pF
Gate Resistance	R_g	$V_{GS} = 0\text{V}$, $V_{DS} = 0\text{V}$, $f = 1\text{MHz}$	-	2.2	-	Ω
SWITCHING PARAMETERS ⁽⁵⁾						
Total Gate Charge (@ $V_{GS} = 10\text{V}$)	Q_g	$V_{GS} = 0$ to 10V $V_{DS} = 20\text{V}$, $I_D = 20\text{A}$	-	20	-	nC
Gate Source Charge	Q_{gs}		-	6.7	-	nC
Gate Drain Charge	Q_{gd}		-	4.4	-	nC
Turn-On DelayTime	$t_{D(on)}$	$V_{GS} = 10\text{V}$, $V_{DS} = 20\text{V}$ $I_D = 20\text{A}$, $R_{GEN} = 3\Omega$	-	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}	$I_F = 20\text{A}$, $dI_F/dt = 108\text{A}/\mu\text{s}$	-	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	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.0	4.8	$^\circ\text{C}/\text{W}$

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 [$L = 0.1\text{mH}$, $V_{GS} = 10\text{V}$, $V_{DS} = 20\text{V}$] 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.

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Typical Electrical & Thermal Characteristics

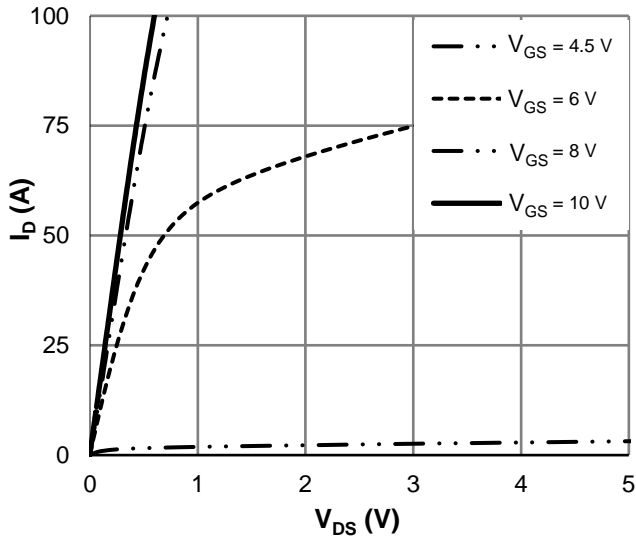


Figure 3: Saturation Characteristics

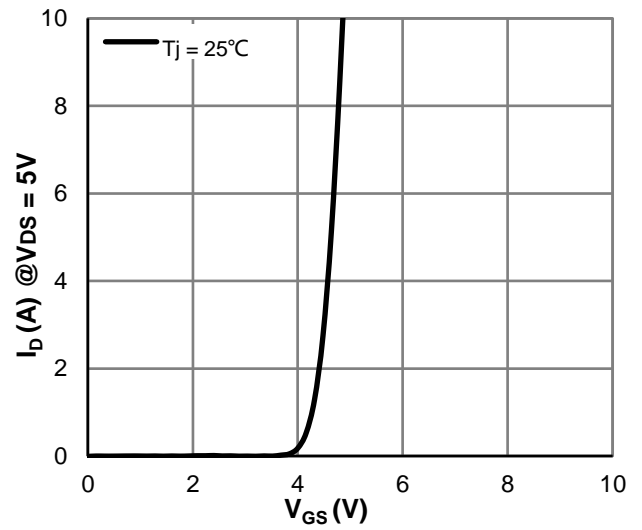


Figure 4: Transfer Characteristics

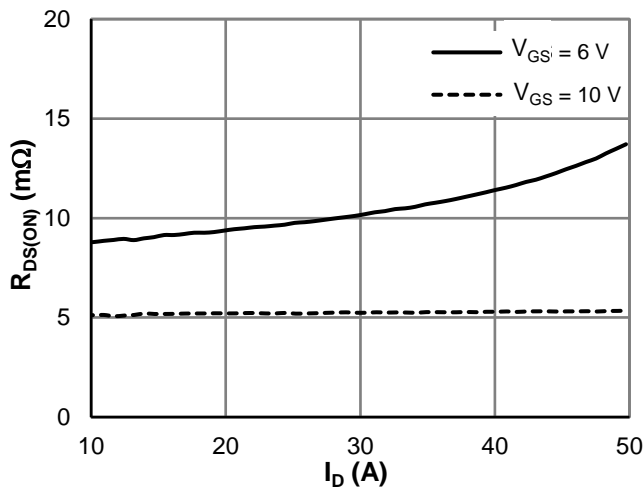


Figure 5: R_DS(ON) vs. Drain Current

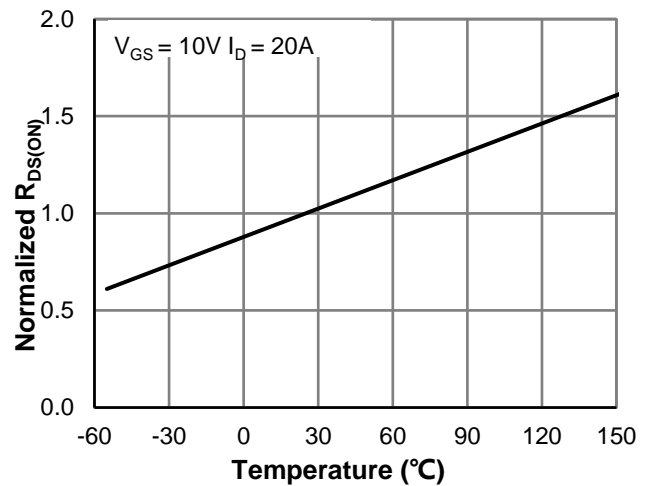


Figure 6: R_DS(ON) vs. Junction Temperature

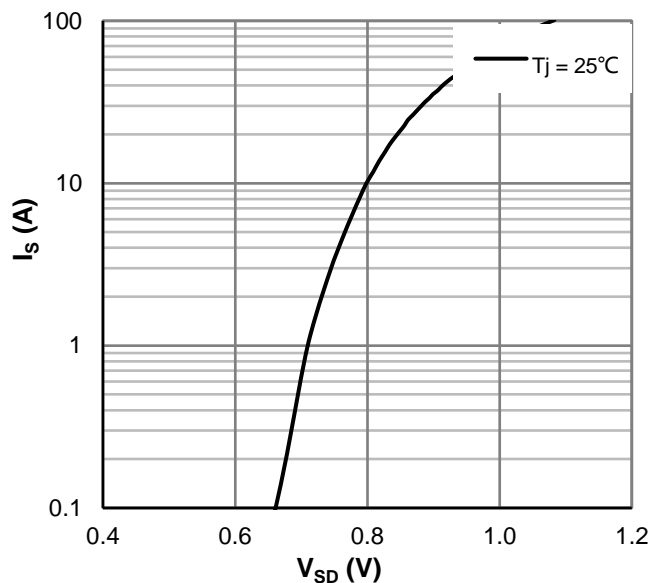


Figure 7: Body-Diode Characteristics

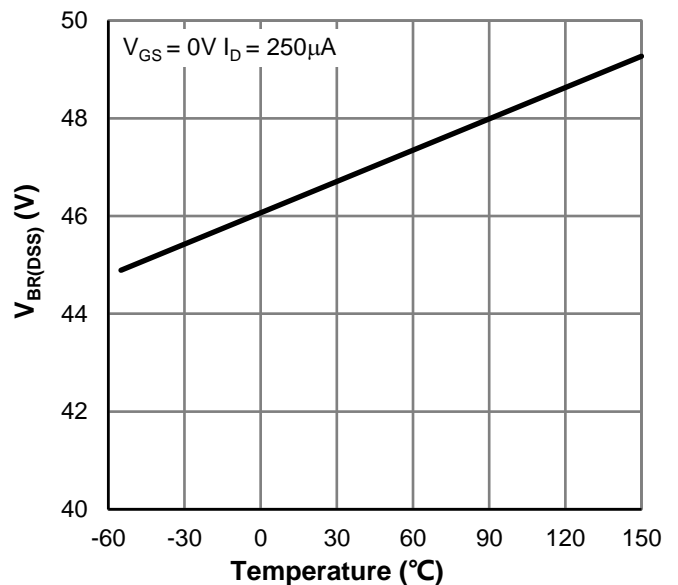


Figure 8: $V_{BR(DSS)}$ vs. Junction Temperature

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Typical Electrical & Thermal Characteristics

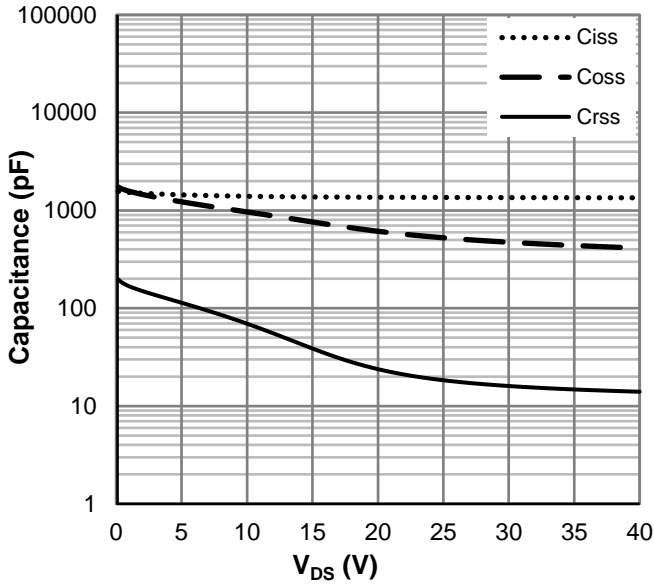


Figure 9: Capacitance Characteristics

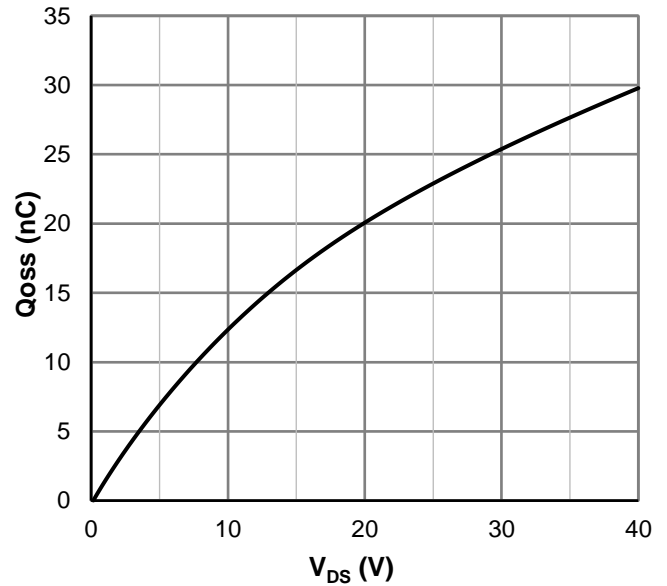


Figure 10: Coss Stored Energy

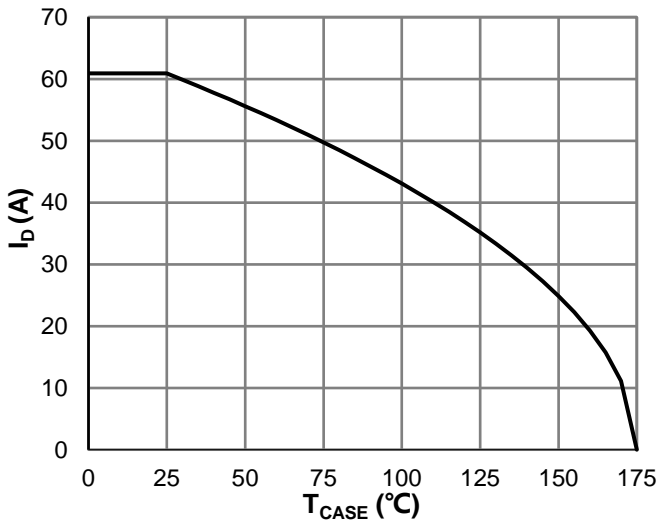


Figure 11: Current De-rating

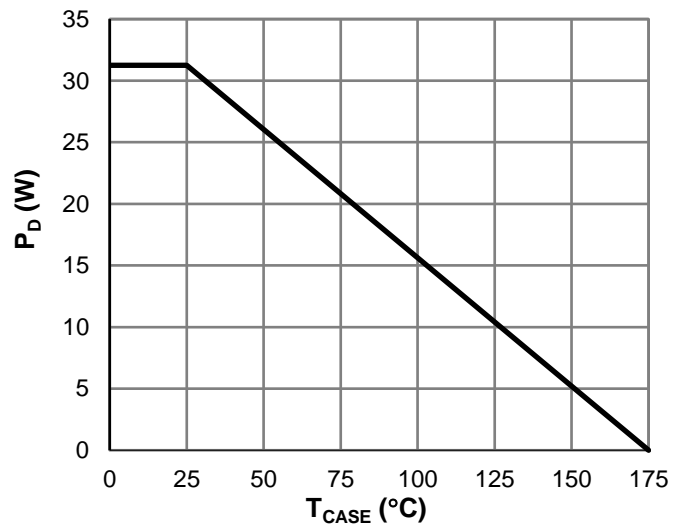


Figure 12: Power De-rating

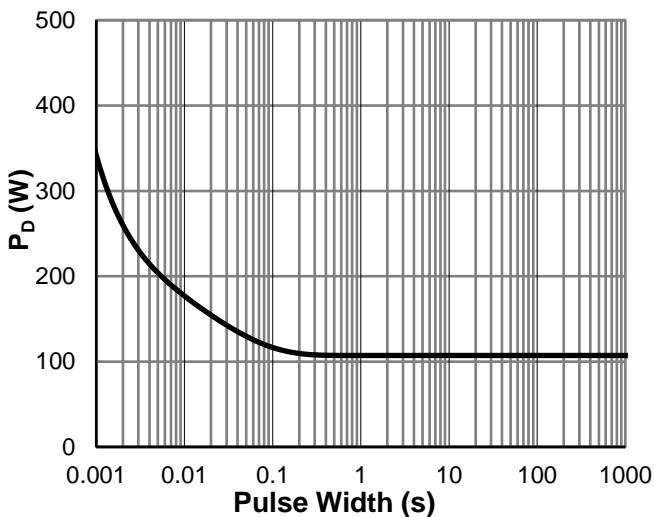


Figure 13: Single Pulse Power Rating, Junction-to-Case

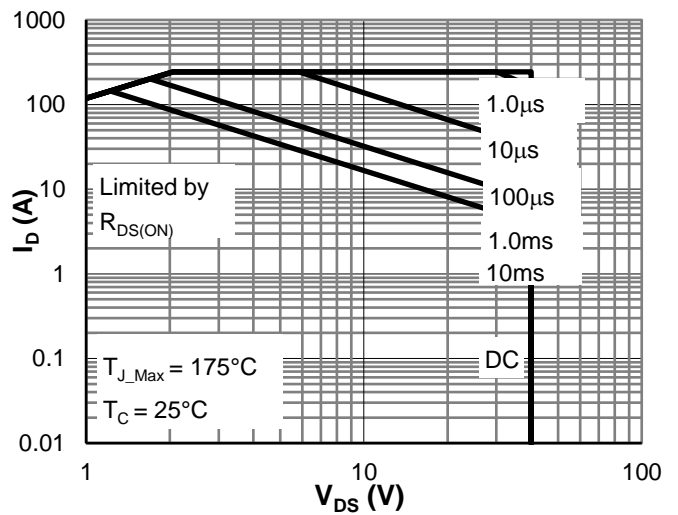


Figure 14: Maximum Safe Operating Area

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Typical Electrical & Thermal Characteristics

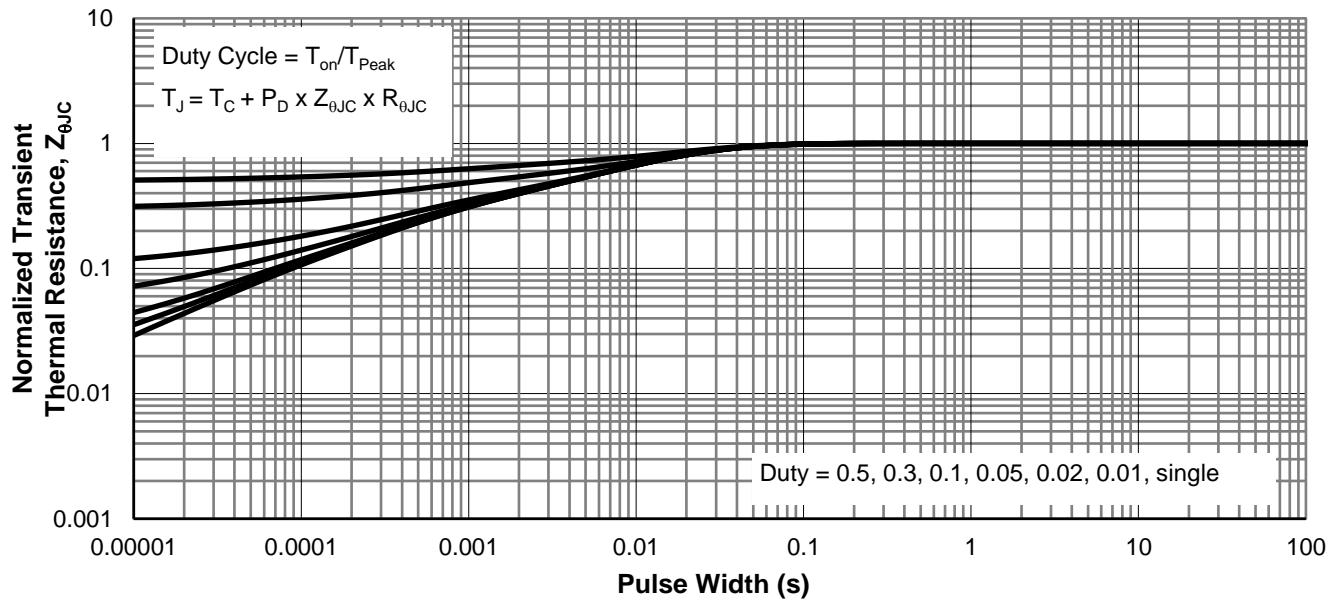


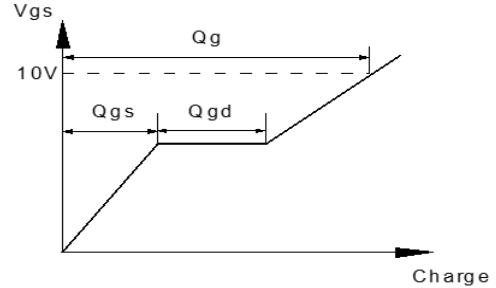
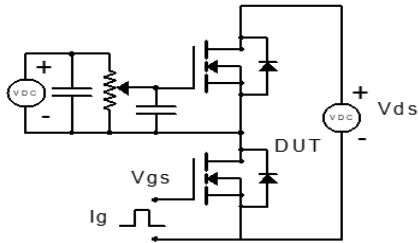
Figure 15: Normalized Maximum Transient Thermal Impedance

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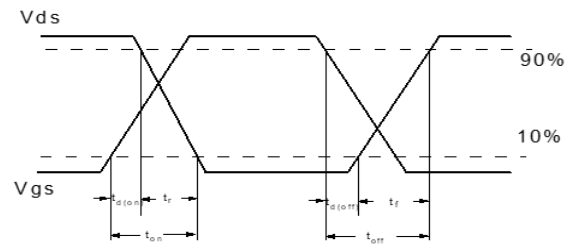
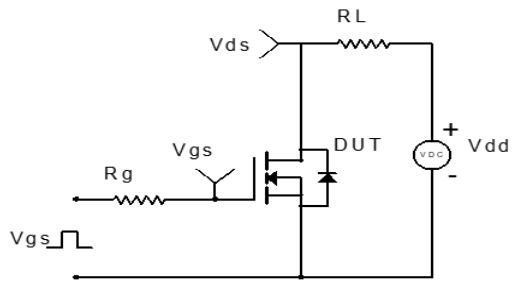
Datasheet

Test Condition

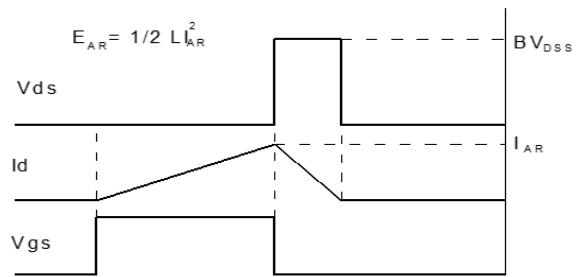
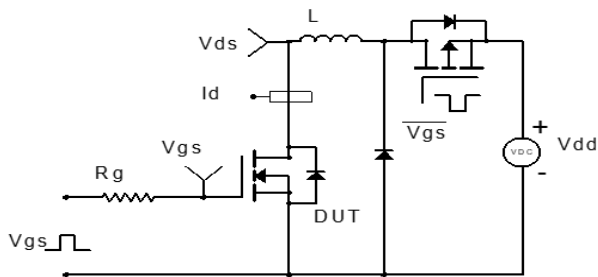
Gate Charge Test Circuit & Wave Form



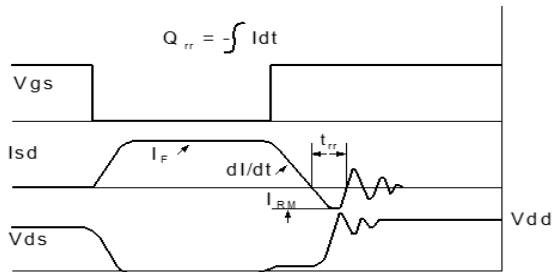
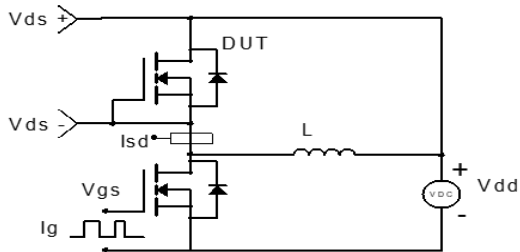
Resistive Switching Test Circuit & Wave Form



Unclamped Inductive Switching (UIS)



Diode Recovery Test Circuit & Wave Form

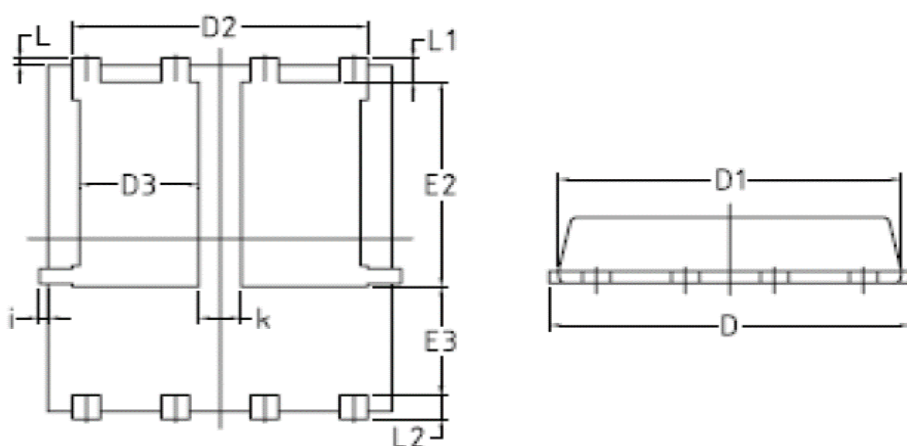
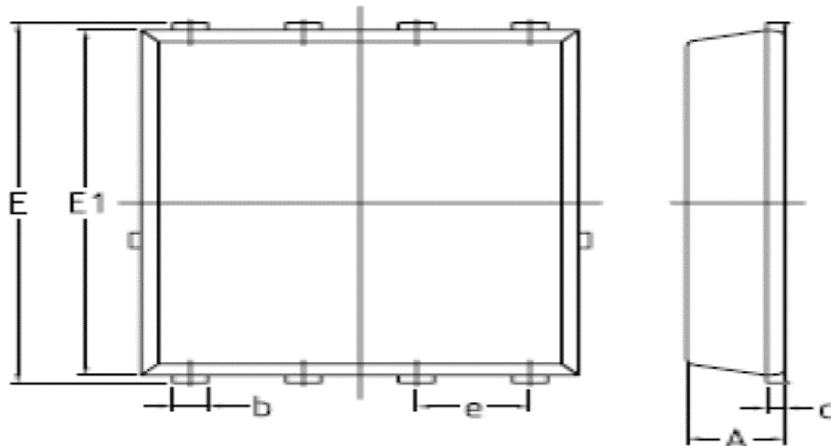


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Package Outlines

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

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Revision History

Version	date	Change Description
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