General Description

FSMOS® MOSFET is based on Oriental Semiconductor's unique device design to achieve low $R_{DS(ON)}$, low gate charge, fast switching and excellent avalanche characteristics. The low V_{th} series is specially optimized for synchronous rectification systems with low driving voltage.

Features

- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Excellent reliability and uniformity
- Fast switching and soft recovery

RoHS compliant

Applications

- High frequency point-of-load synchronous buck concerter for MB/NB/UMPC/VGA
- Networking DC-DC power system
- CCFL back-light inverter

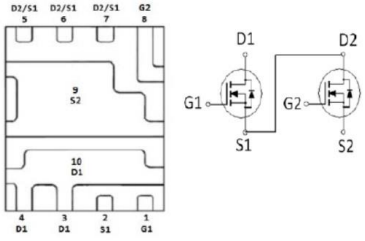
Key Performance Parameters

	Die1	Die2
V_{DS}	30 V	30 V
$I_{D, pulse}$	180 A	640 A
$R_{DS(ON), max}$ @ V_{GS}=10V	5 mΩ	1.5 mΩ
Q_g	22 nC	86 nC

Marking Information

Product Name	Package	Marking
OSDM0340N	PDFN5×6	OSDM0340N

Package & Pin information



BOTTOM VIEW

Absolute Maximum Ratings at T_j=25°C unless otherwise noted

Parameter	Symbol	Value		Unit
		Die1	Die2	
Drain-source voltage	V_{DS}	30	30	V
Gate-source voltage	V_{GS}	±20	±20	V
Continuous drain current[1], T_C=25 °C	I_D	45	160	A
Pulsed drain current[2], T_C=25 °C	$I_{D, pulse}$	180	640	A
Continuous diode forward current[1], T_C=25 °C	I_S	45	160	A
Diode pulsed current[2], T_C=25 °C	$I_{S, pulse}$	180	640	A
Power dissipation[3], T_C=25 °C	P_D	30	100	W
Single pulsed avalanche energy[5]	E_{AS}	25	163	mJ
Operation and storage temperature	T_{stg}, T_j	-55 to 175	-55 to 175	°C

Thermal Characteristics

Parameter	Symbol	Die1	Die2	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	5	1.5	°C/W
Thermal resistance, junction-ambient[4]	$R_{\theta JA}$	62	62	°C/W

Die1 N-Channel Electrical Characteristics

Die1 N-Channel Electrical Characteristics at T_j=25°c unless otherwise specified						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Test Condition**
Drain-source breakdown voltage	BV_{DSS}	30			V	V_{GS}=0 V, I_D=250 μA
Gate threshold voltage	$V_{GS(th)}$	1.0		2.5	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		3.5	5	mΩ	V_{GS}=10 V, I_D=40 A
Drain-source on-state resistance	$R_{DS(ON)}$		6	8	mΩ	V_{GS}=4.5 V, I_D=20 A
Gate-source leakage current	I_{GSS}			100	nA	V_{GS}=20 V
				-100		V_{GS}=-20 V
Drain-source leakage current	I_{DSS}			1	μA	V_{DS}=30 V, V_{GS}=0 V
Gate resistance	R_G		2.6		Ω	f=1 MHz, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		1390		pF	V_{GS}=0 V, V_{DS}=25 V, f=100 kHz
Output capacitance	C_{oss}		517		pF	
Reverse transfer capacitance	C_{rss}		27		pF	
Turn-on delay time	$t_{d(on)}$		9		ns	V_{GS}=10 V, V_{DS}=30 V, R_G=2 Ω, I_D=30 A
Rise time	t_r		4		ns	
Turn-off delay time	$t_{d(off)}$		22		ns	
Fall time	t_f		7		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		22		nC	V_{GS}=10 V, V_{DS}=30 V, I_D=30 A
Gate-source charge	Q_{gs}		4.5		nC	
Gate-drain charge	Q_{gd}		4		nC	
Gate plateau voltage	$V_{plateau}$		3.4		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	I_S=20 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		52		ns	V_R=30 V, I_S=30 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		40		nC	
Peak reverse recovery current	I_{rrm}		1.3		A	

Note

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) Pd is based on max. junction temperature, using junction-case thermal resistance.
4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_a=25 °C.
5) V_{DD}=30 V,V_{GS}=10 V, L=0.3 mH, starting T_j=25 °C.

Die2 N-Channel Electrical Characteristics

Die2 N-Channel Electrical Characteristics at T_j=25°c unless otherwise specified						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Test Condition**
Drain-source breakdown voltage	BV_{DSS}	30			V	V_{GS}=0 V, I_D=250 μA
Gate threshold voltage	$V_{GS(th)}$	1.0		2.5	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		0.95	1.5	mΩ	V_{GS}=10 V, I_D=55 A
Drain-source on-state resistance	$R_{DS(ON)}$		1.38	2.5	mΩ	V_{GS}=4.5 V, I_D=55 A
Gate-source leakage current	I_{GSS}			100	nA	V_{GS}=20 V
				-100		V_{GS}=-20 V
Drain-source leakage current	I_{DSS}			1	μA	V_{DS}=30 V, V_{GS}=0 V
Gate resistance	R_G		1.6		Ω	f=1 MHz, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		5310		pF	V_{GS}=0 V, V_{DS}=25 V, f=100 kHz
Output capacitance	C_{oss}		1170		pF	
Reverse transfer capacitance	C_{rss}		117		pF	
Turn-on delay time	$t_{d(on)}$		15.8		ns	V_{GS}=10 V, V_{DS}=30 V, R_G=2 Ω, I_D=15 A
Rise time	t_r		9.2		ns	
Turn-off delay time	$t_{d(off)}$		50		ns	
Fall time	t_f		57.4		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		86		nC	V_{GS}=10 V, V_{DS}=30 V, I_D=15 A
Gate-source charge	Q_{gs}		13		nC	
Gate-drain charge	Q_{gd}		17		nC	
Gate plateau voltage	$V_{plateau}$		2.5		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	I_S=20 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		111		ns	V_R=30 V, I_S=15 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		128		nC	
Peak reverse recovery current	I_{rrm}		2.2		A	

Note

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) Pd is based on max. junction temperature, using junction-case thermal resistance.
4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_a=25 °C.
5) V_{DD}=30 V,V_{GS}=10 V, L=0.3 mH, starting T_j=25 °C.

Die1 Electrical Characteristics Diagrams

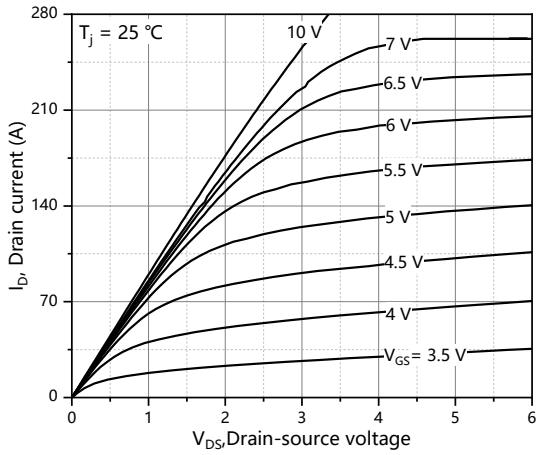


Figure 1. Typ. output characteristics

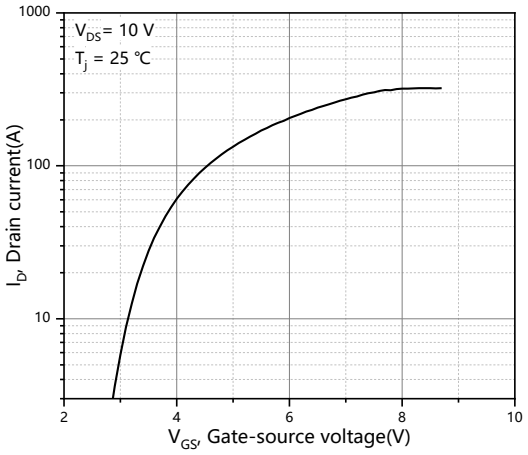


Figure 2. Typ. transfer characteristics

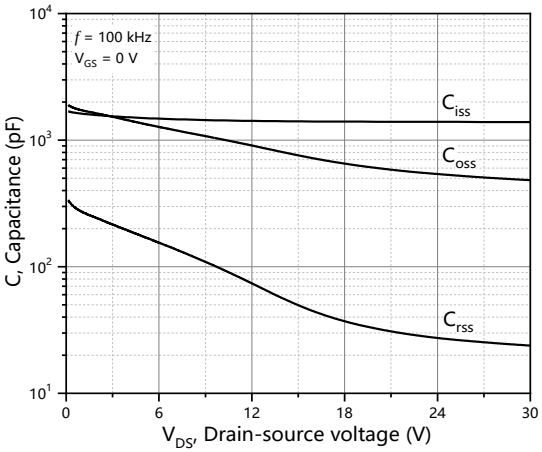


Figure 3. Typ. capacitances

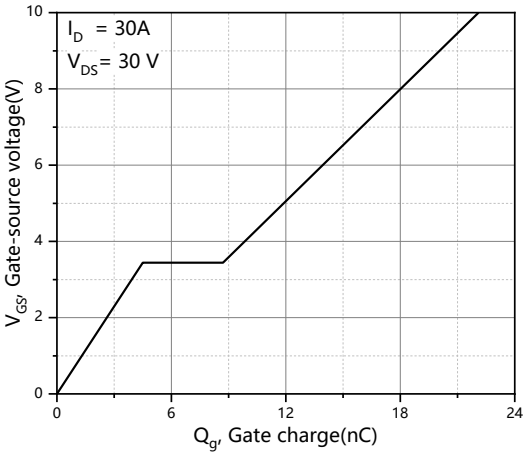


Figure 4. Typ. gate charge

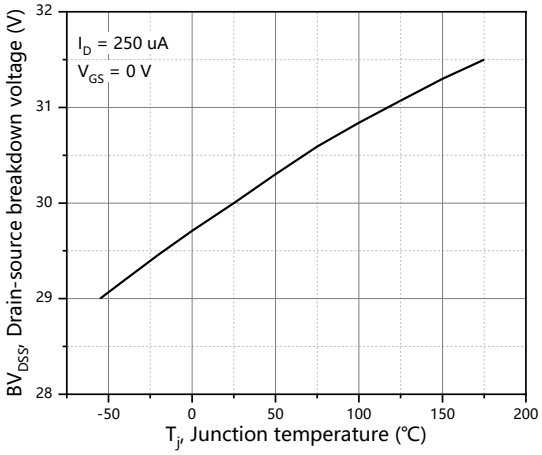


Figure 5. Drain-source breakdown voltage

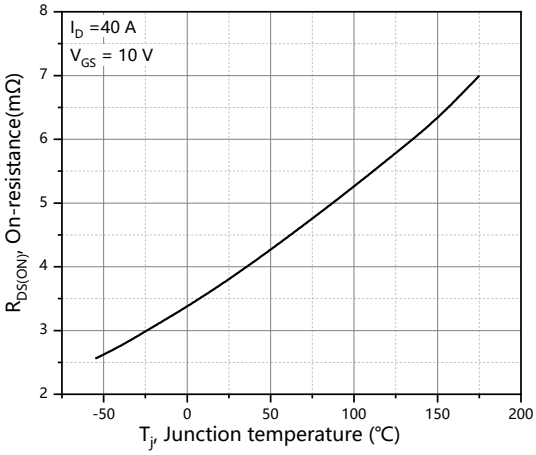


Figure 6. Drain-source on-state resistance

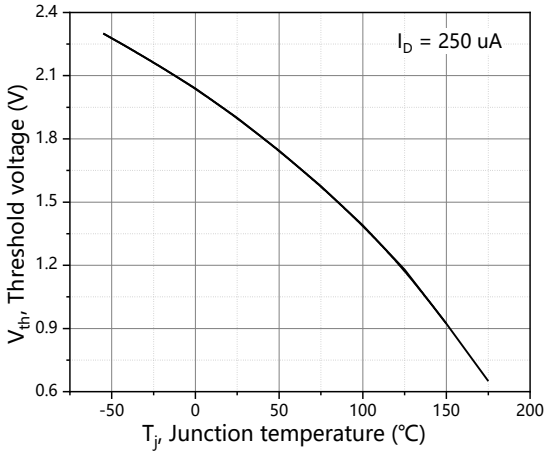


Figure 7. Threshold voltage

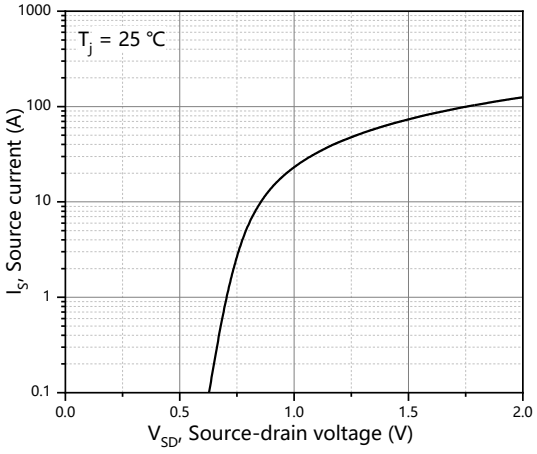


Figure 8. Forward characteristic of body diode

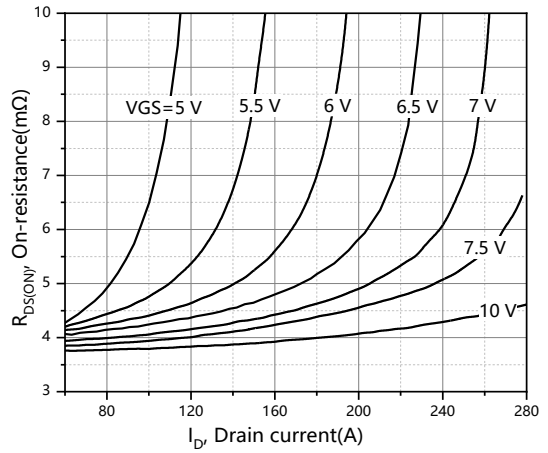


Figure 9. Drain-source on-state resistance

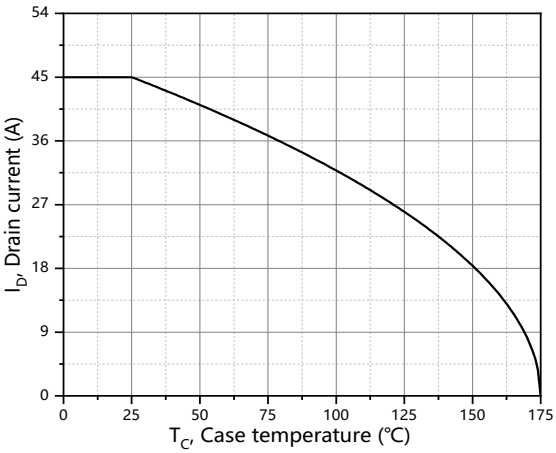


Figure 10. Drain current

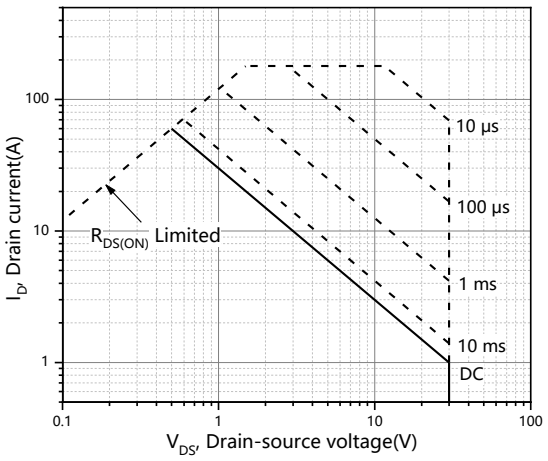


Figure 11. Safe operation area T_C=25℃

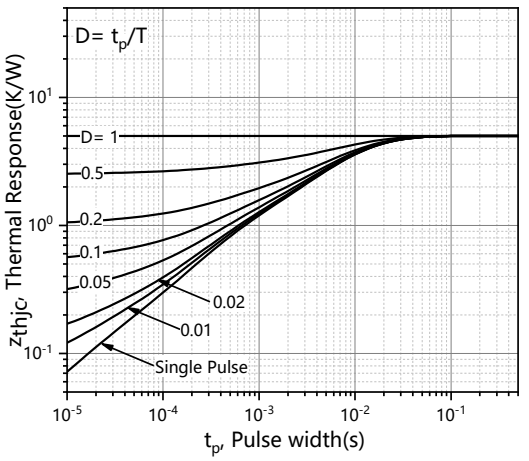


Figure 12. Max. transient thermal impedance

Die2 Electrical Characteristics Diagrams

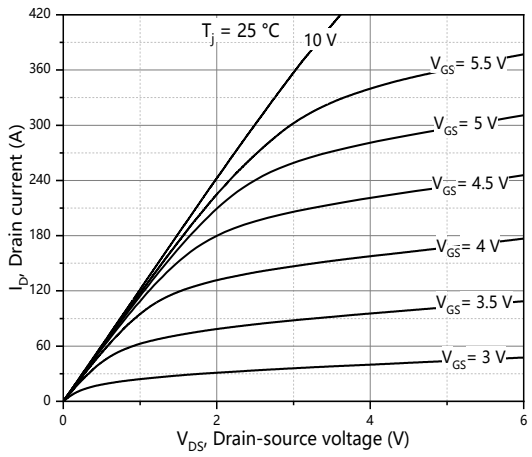


Figure 1. Typ. output characteristics

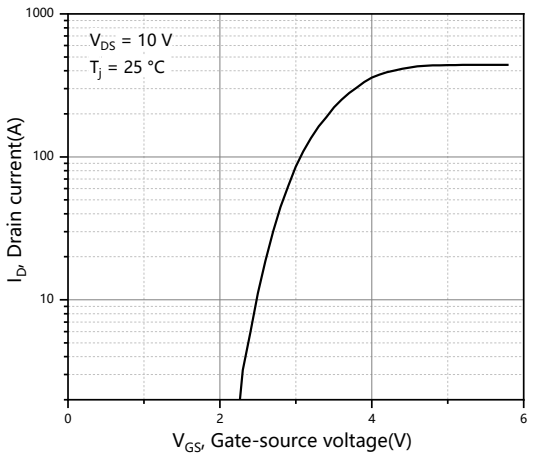


Figure 2. Typ. transfer characteristics

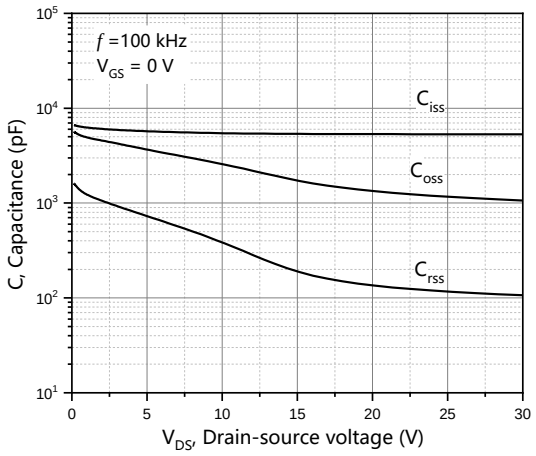


Figure 3. Typ. capacitances

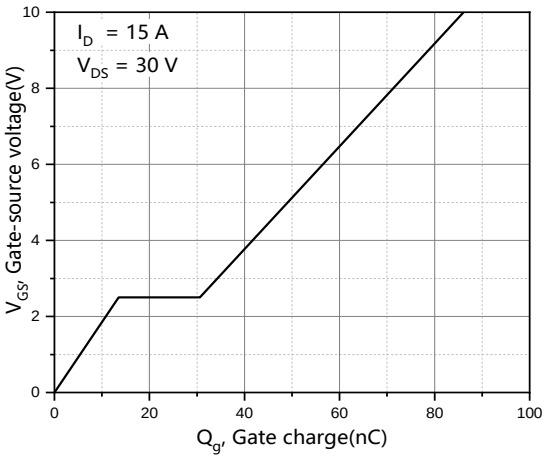


Figure 4. Typ. gate charge

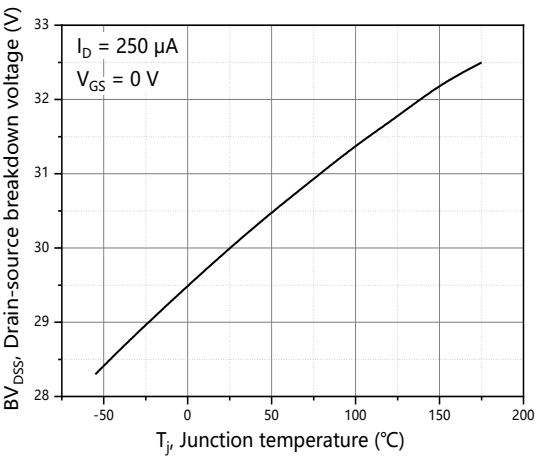


Figure 5. Drain-source breakdown voltage

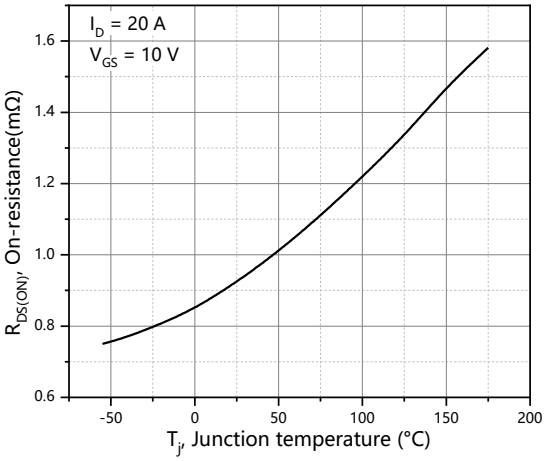


Figure 6. Drain-source on-state resistance

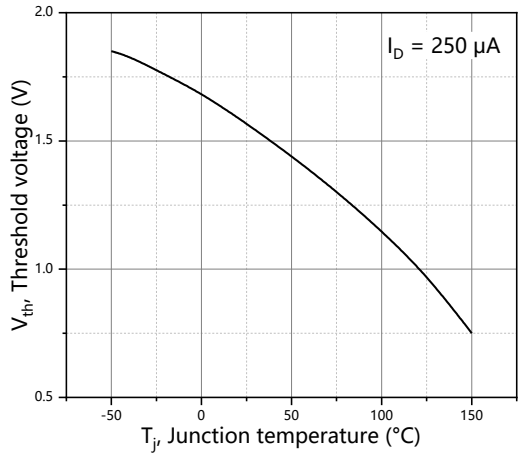


Figure 7. Threshold voltage

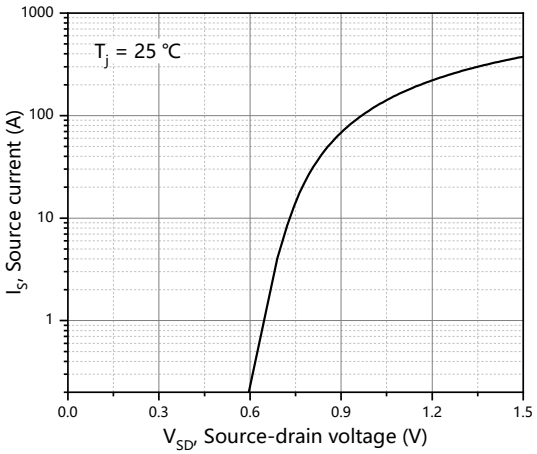


Figure 8. Forward characteristic of body diode

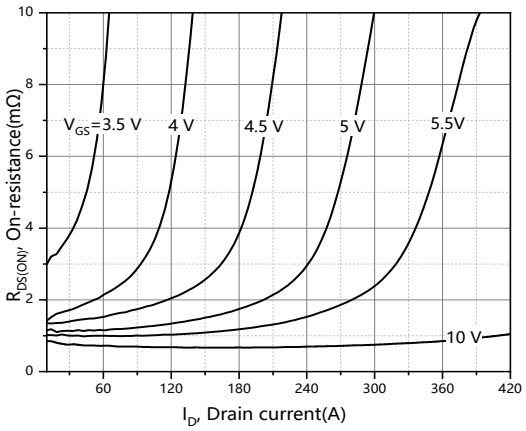


Figure 9. Drain-source on-state resistance

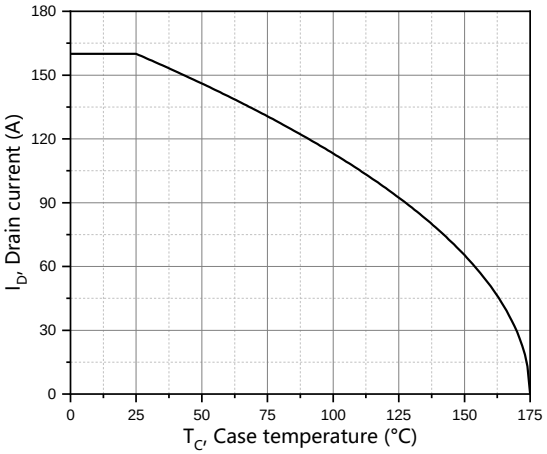


Figure 10. Drain current

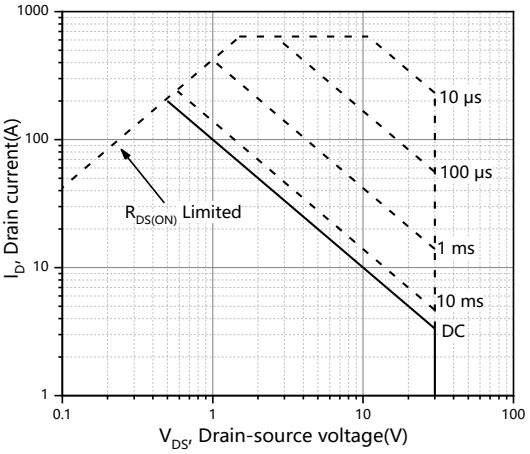


Figure 11. Safe operation area T_C=25℃

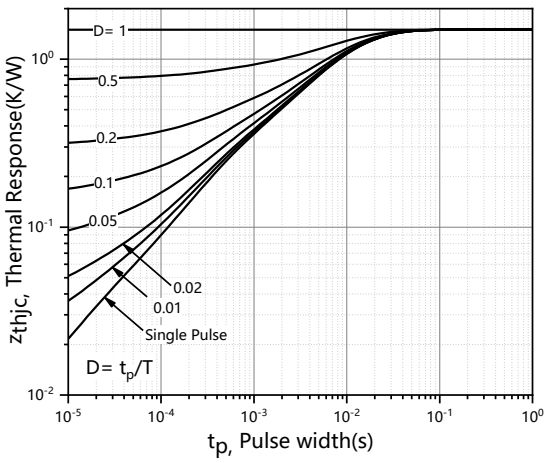


Figure 12. Max. transient thermal impedance

Test circuits and waveforms

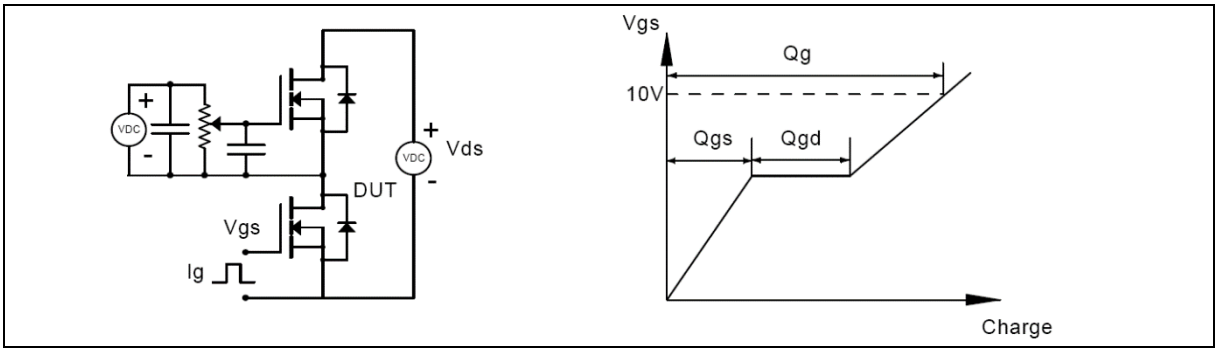


Figure 1. Gate charge test circuit & waveform

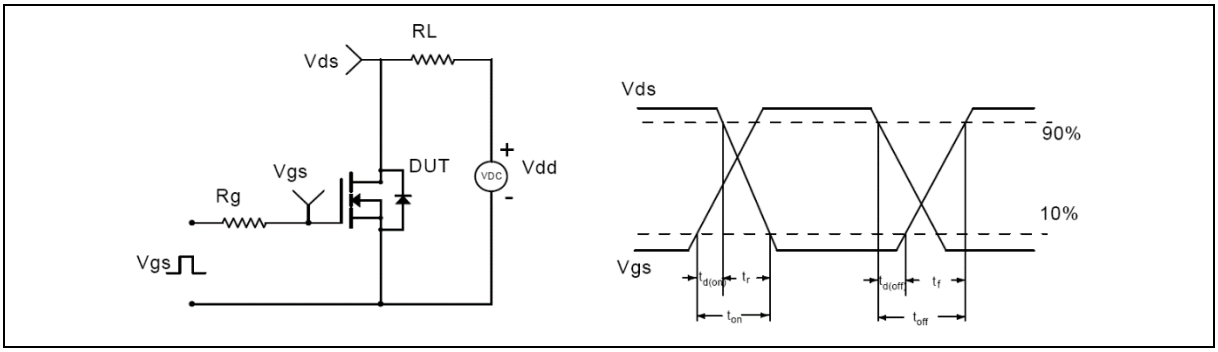


Figure 2. Switching time test circuit & waveforms

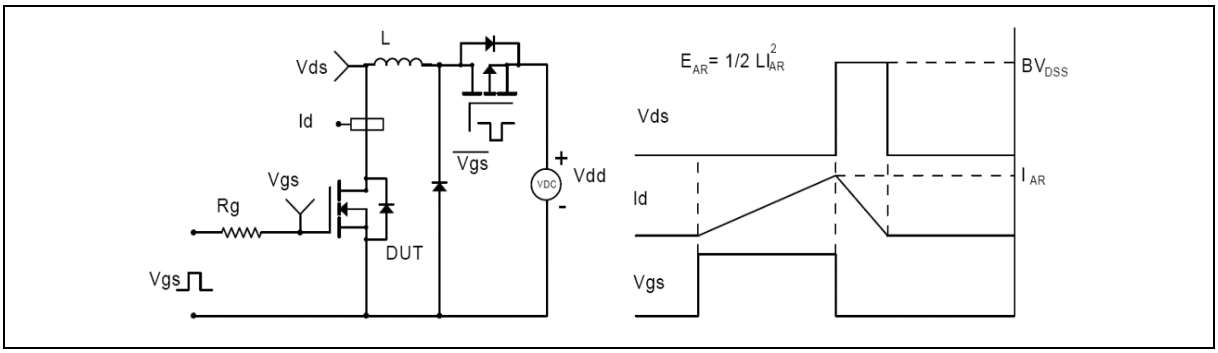


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

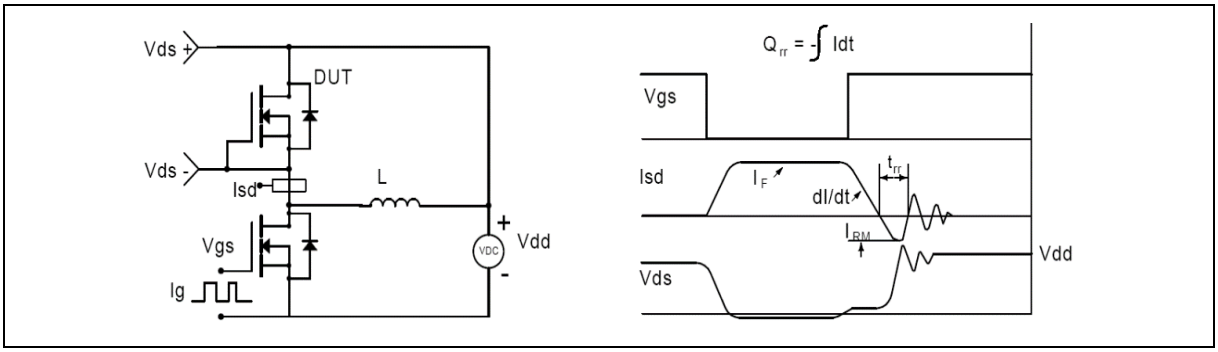
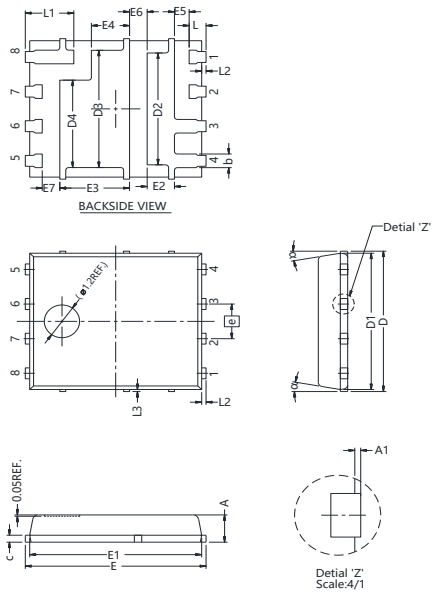


Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm		
	Min	Nom	Min
A	0.90	1.00	1.10
A1	0.00		0.05
b	0.40	0.50	0.60
c	0.20	0.25	0.30
D	5.15 BSC		
D1	4.90	5.00	5.10
D2	4.00	4.10	4.20
D3	4.20	4.30	4.40
D4	3.11	3.21	3.31
E	6.15 BSC		
E1	5.80	5.85	5.90
E2	0.83	0.93	1.03
E3	2.27	2.37	2.47
E4	1.195	1.295	1.395
E5	0.40	0.50	0.60
E6	0.50	0.60	0.70
E7	0.50	0.60	0.70
e	1.27 BSC		
L	0.475	0.575	0.675
L1	1.55	1.65	1.75
L2	0.08	0.15	0.230
L3			0.10
α	8°	10°	12°

Version 1: PDFN5×6-J package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
PDFN5×6-J	5000	1	5000	5	25000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSDM0340N	PDFN5×6	yes	yes	yes

Legal Disclaimer

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