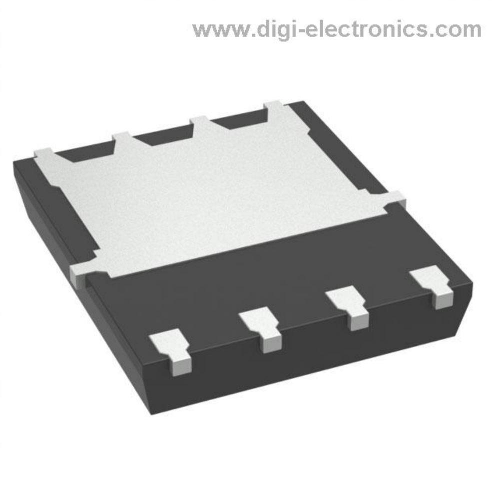
FDMS7658AS Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number	FDMS7658AS-DG
Manufacturer	onsemi
Manufacturer Product Number	FDMS7658AS
Description	MOSFET N-CH 30V 29A/70A 8PQFN
Detailed Description	N-Channel 30 V 29A (Ta), 70A (Tc) 2.5W (Ta), 89W (Tc) Surface Mount 8-PQFN (5x6)

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
FDMS7658AS	onsemi
Series:	Product Status:
PowerTrench®, SyncFET™	Obsolete
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
30 V	29A (Ta), 70A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
4.5V, 10V	1.9mOhm @ 28A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
3V @ 1mA	109 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±20V	7350 pF @ 15 V
FET Feature:	Power Dissipation (Max):
-	2.5W (Ta), 89W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Surface Mount
Supplier Device Package:	Package / Case:
8-PQFN (5x6)	8-PowerTDFN
Base Product Number:	
FDMS7658	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0095	

ON Semiconductor®

FDMS7658AS

N-Channel PowerTrench® SyncFET™

30 V, 176 A, 1.9 mΩ

Features

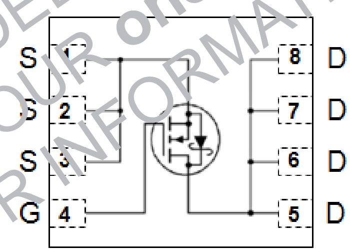
- Max $r_{DS(on)}$ = 1.9 mΩ at V_{GS} = 10 V, I_D = 28 A
- Max $r_{DS(on)}$ = 2.2 mΩ at V_{GS} = 7 V, I_D = 26 A
- Advanced Package and Silicon Combination for Low $r_{DS(on)}$ and High Efficiency
- SyncFET™ Schottky Body Diode
- MSL1 Robust Package Design
- 100% UIL Tested
- RoHS Compliant

General Description

The FDMS7658AS has been designed to minimize losses in power conversion application. Advancements in both silicon and package technologies have been combined to offer the lowest $r_{DS(on)}$ while maintaining excellent switching performance. This device has the added benefit of an efficient monolithic Schottky body diode.

Applications

- Synchronous Rectifier for DC/DC Converters
- Notebook Vcore/ GPU Low Side Switch
- Networking Point of Load Low Side Switch
- Telecom Secondary Side Rectification



MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted.

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			30	V
V_{GS}	Gate to Source Voltage		(Note 4)	±20	V
I_D	Drain Current -Continuous	T_C = 25 °C	(Note 5)	176	A
	-Continuous	T_C = 100 °C	(Note 5)	112	
	-Continuous	T_A = 25 °C	(Note 1a)	29	
	-Pulsed		(Note 6)	670	
dv/dt	MOSFET dv/dt			1.5	V/ns
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	162	mJ
P_D	Power Dissipation	T_C = 25 °C		89	W
	Power Dissipation	T_A = 25 °C	(Note 1a)	2.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case		1.4	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	50	

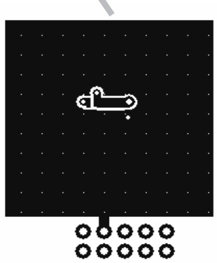
Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS7658AS	FDMS7658AS	Power 56	13 ”	12 mm	3000 units

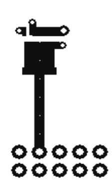
Electrical Characteristics T_J = 25 °C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 1 mA, V_{GS} = 0 V	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 10 mA, referenced to 25 °C		23		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V			500	μA
I_{GSS}	Gate to Source Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, I_D = 1 mA	1.2	1.7	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 10 mA, referenced to 25 °C		-5		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 28 A		1.5	1.9	mΩ
		V_{GS} = 7 V, I_D = 26 A		[illegible]	[illegible]	
		V_{GS} = 4.5 V, I_D = 23 A		[illegible]	2.4	
		V_{GS} = 10 V, I_D = 28 A, T_J = 125 °C		2.0	2.6	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 28 A		181		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		5525	7350	pF
C_{oss}	Output Capacitance			2020	2685	pF
C_{rss}	Reverse Transfer Capacitance			[illegible]	230	pF
R_g	Gate Resistance		0.1	0.4	0.9	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 15 V, I_D = 28 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		20	36	ns
t_r	Rise Time			8	17	ns
$t_{d(off)}$	Turn-Off Delay Time			43	70	ns
t_f	Fall Time			5	10	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 15 V, I_D = 28 A		78	109	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 4.5 V; V_{DD} = 15 V, I_D = 28 A		35	49	nC
Q_{gs}	Gate to Source Gate Charge			16.4		nC
Q_{gd}	Gate to Drain "Miller" Charge			6.6		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2 A (Note 2)		0.38	0.9	V
		V_{GS} = 0 V, I_S = 28 A (Note 2)		0.74	1.3	V
t_{rr}	Reverse Recovery Time	I_F = 28 A, di/dt = 300 A/μs		46	75	ns
Q_{rr}	Reverse Recovery Charge			73	117	nC

Notes:
1. $R_{\theta JA}$ is determined with the device mounted on a 1in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 50 °C/W when mounted on a 1 in^2 pad of 2 oz copper.



b. 125 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. E_{AS} of 162 mJ is based on starting T_J = 25 °C, L = 1 mH, I_{AS} = 18 A, V_{DD} = 27 V, V_{GS} = 10 V. 100% test at L = 0.3 mH, I_{AS} = 28 A.
4. As an N-ch device, the negative Vgs rating is for low duty cycle pulse occurrence only. No continuous rating is implied.
5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.
6. Pulsed Id please refer to Fig 11 SOA graph for more details.

Typical Characteristics T_J = 25 °C unless otherwise noted.

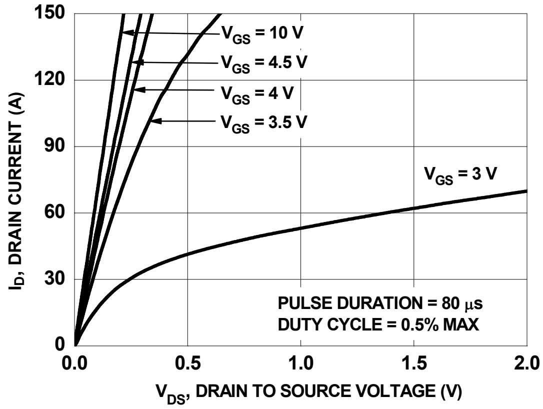


Figure 1. On-Region Characteristics

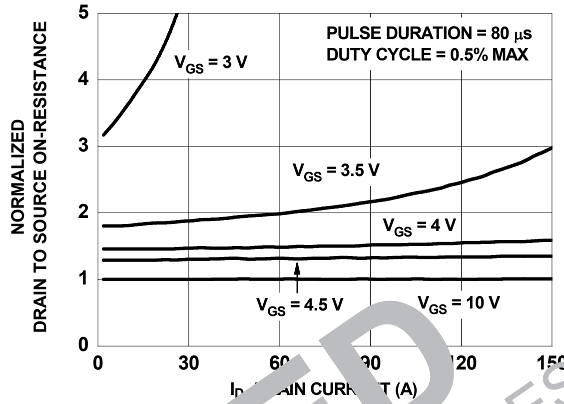


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

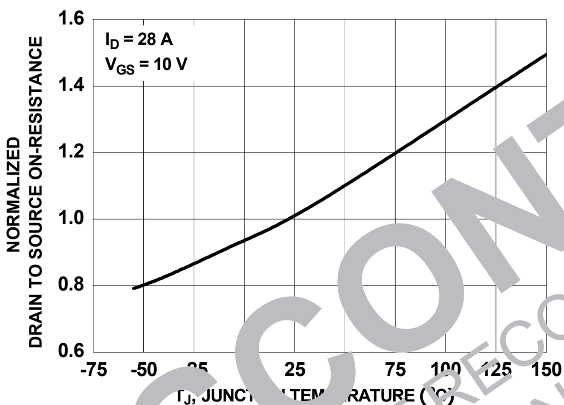


Figure 3. Normalized On-Resistance vs. Junction Temperature

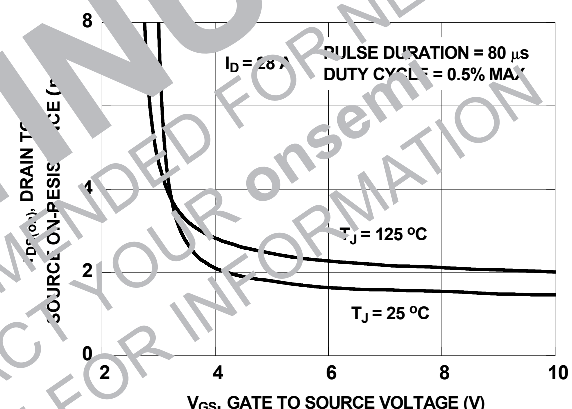


Figure 4. On-Resistance vs. Gate to Source Voltage

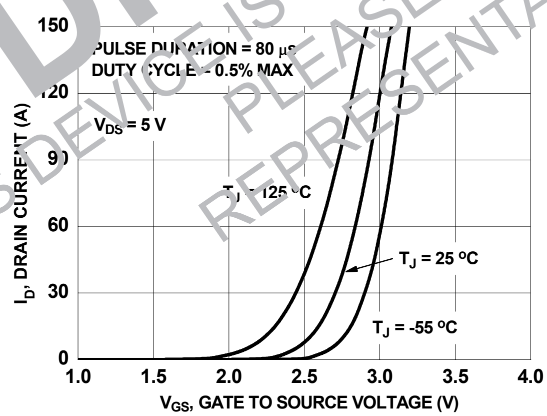


Figure 5. Transfer Characteristics

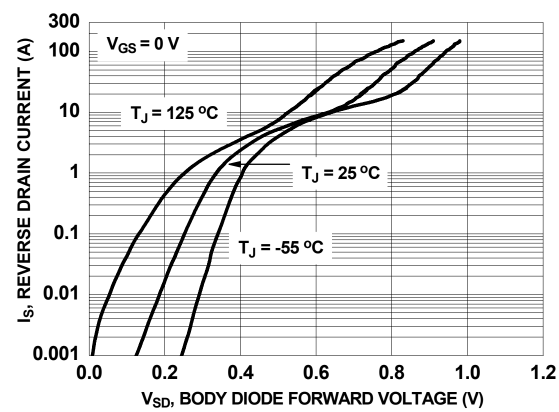


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted.

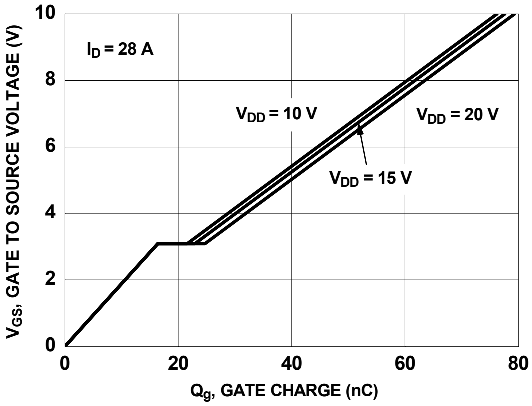


Figure 7. Gate Charge Characteristics

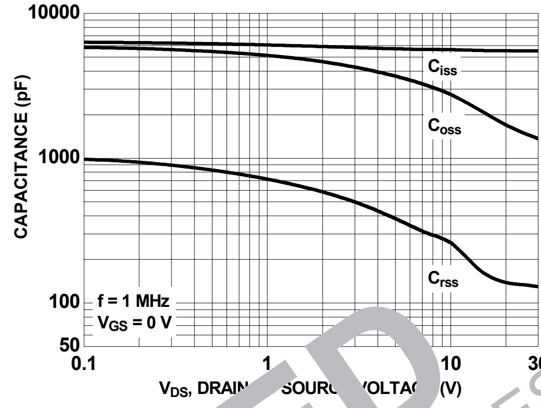


Figure 8. Capacitance vs. Drain to Source Voltage

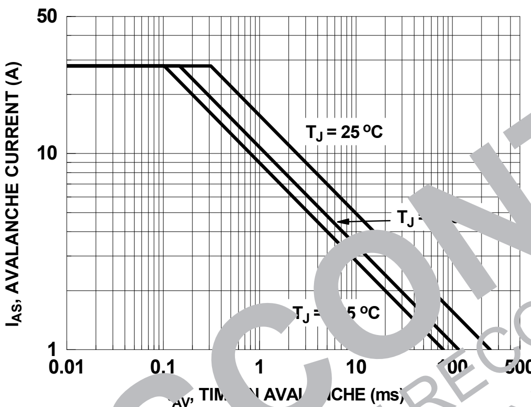


Figure 9. Unclamped Inductive Switching Capability

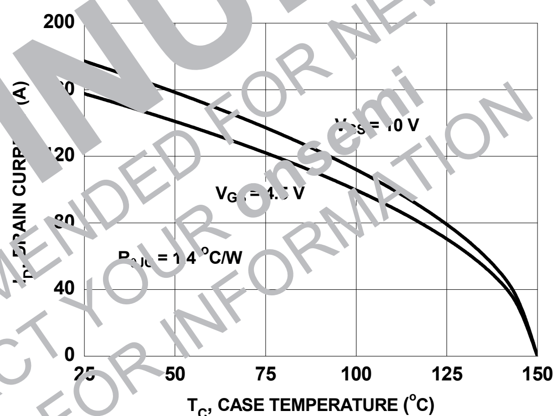


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

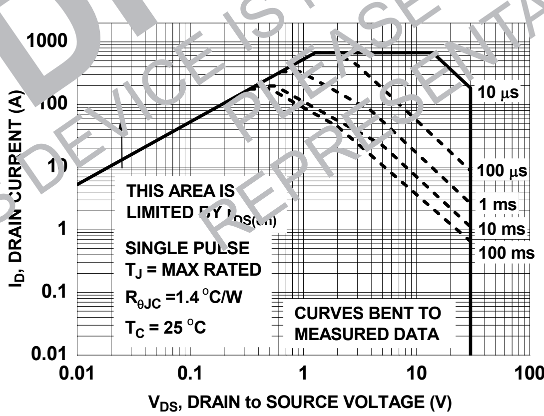


Figure 11. Forward Bias Safe Operating Area

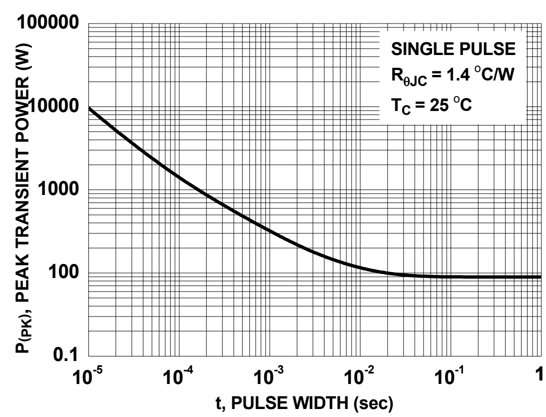


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted.

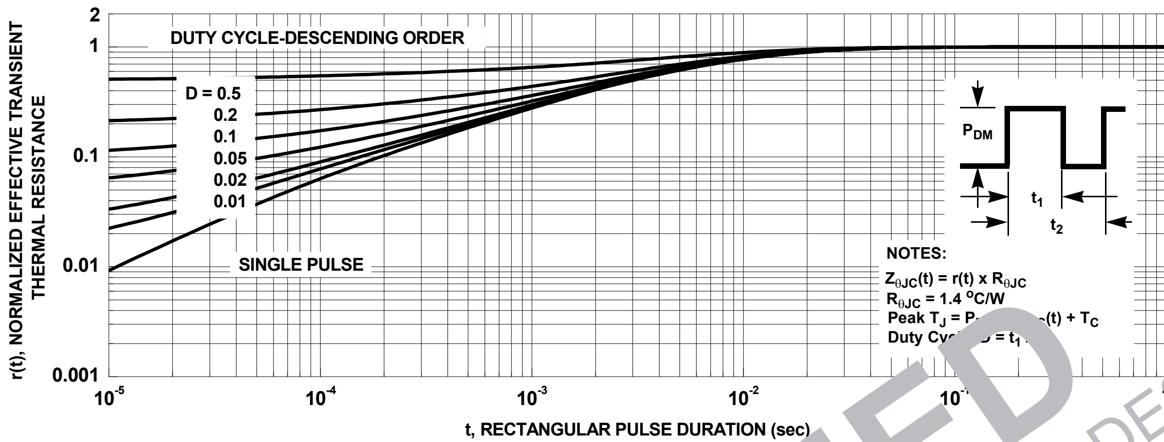


Figure 13. Junction-to-Case Transient Thermal Response Curve

Typical Characteristics (continued)

SyncFET™ Schottky body diode Characteristics

ON Semiconductor’s SyncFET™ process embeds a Schottky diode in parallel with PowerTrench MoSFET. This diode exhibits similar characteristics to a discrete external Schottky diode in parallel with a MOSFET. Figure 14 shows the reverses recovery characteristic of the FDMS7658AS.

Schottky barrier diodes exhibit significant leakage at high temperature and high reverse voltage. This will increase the power in the device.

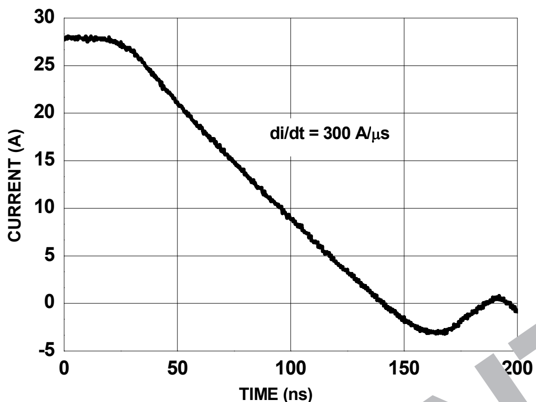


Figure 14. FDMS7658AS SyncFET™ Body Diode Reverse Recovery Characteristic

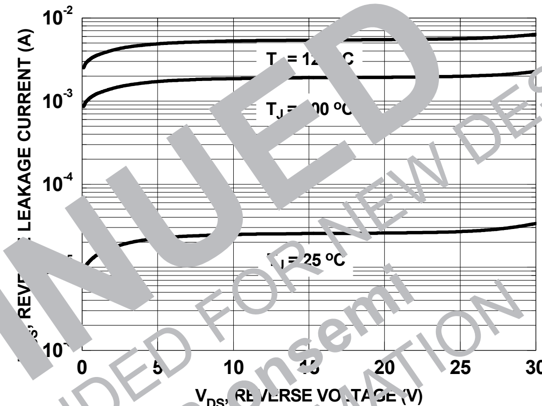


Figure 15. SyncFET™ Body Diode Reverses Leakage vs. Drain-Source Voltage

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

OUR CERTIFICATE

DiGi provide top-quality products and perfect service for customer worldwide through standardization, technological innovation and continuous improvement. DiGi through third-party certification, we striciy control the quality of products and services. Welcome your RFQ to Email: Info@DiGi-Electronics.com

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.