

General Description

This MOSFET uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as -4.5V. This device is suitable for use as a wide variety of applications.

Features

- Low gate charge
- 100% UIS tested, 100% DVDS tested
- High power and current handling capability
- Lead free product is acquired

Applications

- Load switch
- PWM Applications
- Power Management



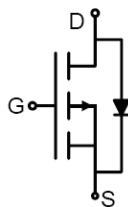
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	-40	V
$R_{DS(ON), max} @ V_{GS} = -10V$	13.2	m Ω

Marking Information

Product Name	Package	Marking
OSH04P13DF	TO-252	OSH04P13D

Package & Pin information



Absolute Maximum Ratings at $T_j=25^{\circ}\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	-40	V
Gate-source voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	-51	A
Pulsed Drain Current ¹⁾	$I_{D,pulse}$	-204	A
Power Dissipation	P_D	60	W
Single pulsed avalanche energy ²⁾	E_{AS}	272	mJ
Operation and storage temperature	T_{stg}, T_j	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	2.1	$^{\circ}\text{C/W}$

Electrical Characteristics at $T_j=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	-40			V	$V_{GS}=0\text{ V}, I_D=-250\text{ }\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	-1.0		-2.5	V	$V_{DS}=V_{GS}, I_D=-250\text{ }\mu\text{A}$
Drain-source on-state resistance	$R_{DS(ON)}$		10.2	13.2	$\text{m}\Omega$	$V_{GS}=-10\text{ V}, I_D=-15\text{ A}$
Drain-source on-state resistance	$R_{DS(ON)}$		13.7	18.2	$\text{m}\Omega$	$V_{GS}=-4.5\text{ V}, I_D=-10\text{ A}$
Gate-source leakage current	I_{GSS}			100	nA	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$
				-100		$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$
Drain-source leakage current	I_{DSS}			-1	μA	$V_{DS}=-40\text{ V}, V_{GS}=0\text{ V}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		3241		pF	$V_{GS}=0\text{ V}$, $V_{DS}=-20\text{ V}$, $f=1.0\text{ MHz}$
Output capacitance	C_{oss}		228		pF	
Reverse transfer capacitance	C_{rss}		205		pF	
Gate resistance	R_g		4.5		Ω	$V_{GS}=0\text{ V}$, $V_{DS}=0\text{ V}$, $f=1.0\text{ MHz}$
Turn-on Delay Time	$t_{d(on)}$		18		ns	$V_{GS}=-10\text{ V}$, $V_{DS}=-20\text{ V}$, $R_L=1\text{ }\Omega$, $R_{GEN}=3\text{ }\Omega$
Turn-on Rise Time	t_r		4.8		ns	
Turn-Off Delay Time	$t_{d(off)}$		88.8		ns	
Turn-Off Fall Time	t_f		26.4		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total Gate Charge	Q_g		60		nC	$V_{GS}=-10\text{ V}$, $V_{DS}=-20\text{ V}$, $I_D=-20\text{ A}$
Gate-Source Charge	Q_{gs}		8.6		nC	
Gate-Drain Charge	Q_{gd}		13.9		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Source drain current (Body Diode)	I_{SD}			-51	A	$T_A=25^\circ\text{C}$
Diode forward voltage ³⁾	V_{SD}			-1.2	V	$I_S=-10\text{ A}$, $V_{GS}=0\text{ V}$
Reverse Recovery Time	t_{rr}		17.3		ns	$I_F=-10\text{ A}$, $di/dt=100\text{ A/us}$
Reverse Recovery Charge	Q_{rr}		9.5		nC	

Note: 1) Pulse width limited by maximum allowable junction temperature.
 2) EAS condition: $T_J=25^\circ\text{C}$, $V_{DD}=-40\text{ V}$, $V_G=-10\text{ V}$, $R_g=25\text{ }\Omega$, $L=0.5\text{ mH}$.
 3) Repetitive Rating: Pulse width limited by maximum junction temperature.

Electrical Characteristics Diagrams

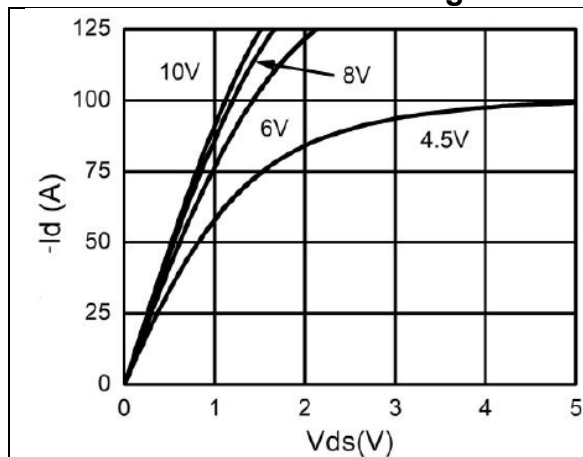


Figure 1. Typ. output characteristics

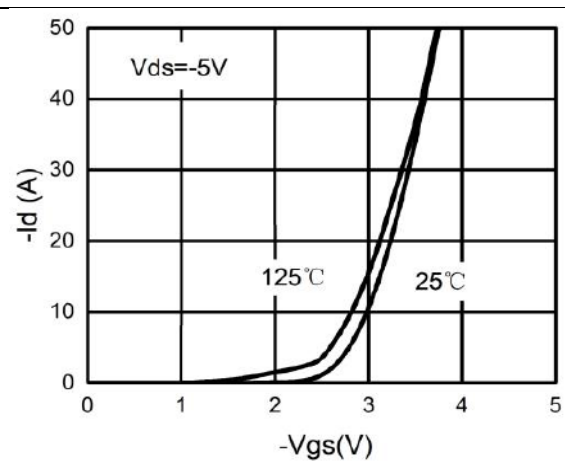


Figure 2. Typ. transfer characteristics

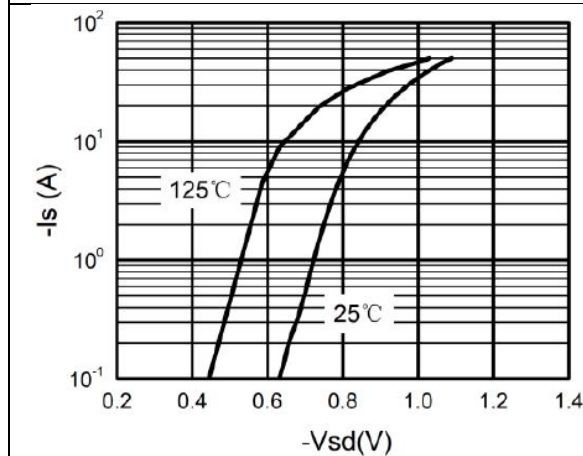


Figure 3. Body-diode characteristics

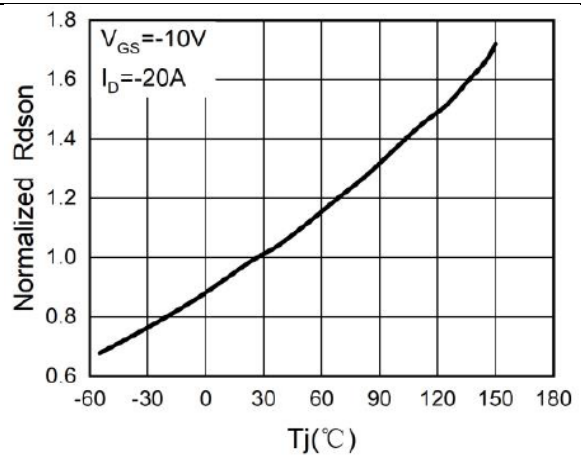


Figure 4. $R_{DS(on)}$ vs junction temperature

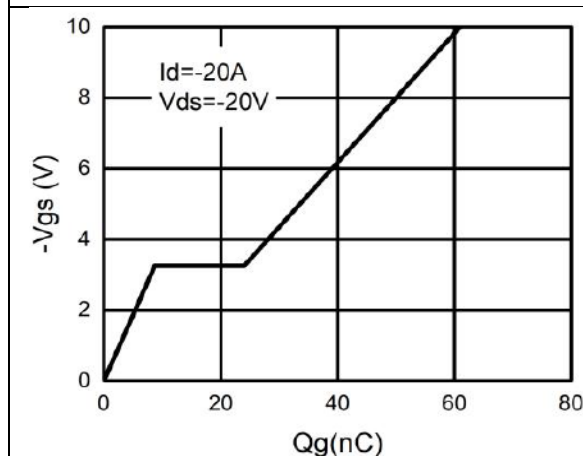


Figure 5. Gate charge waveforms

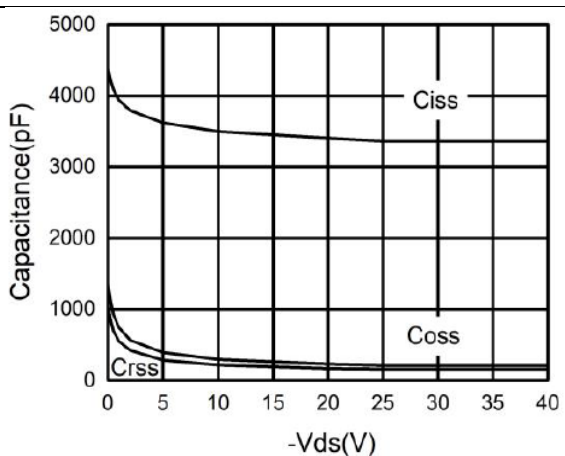
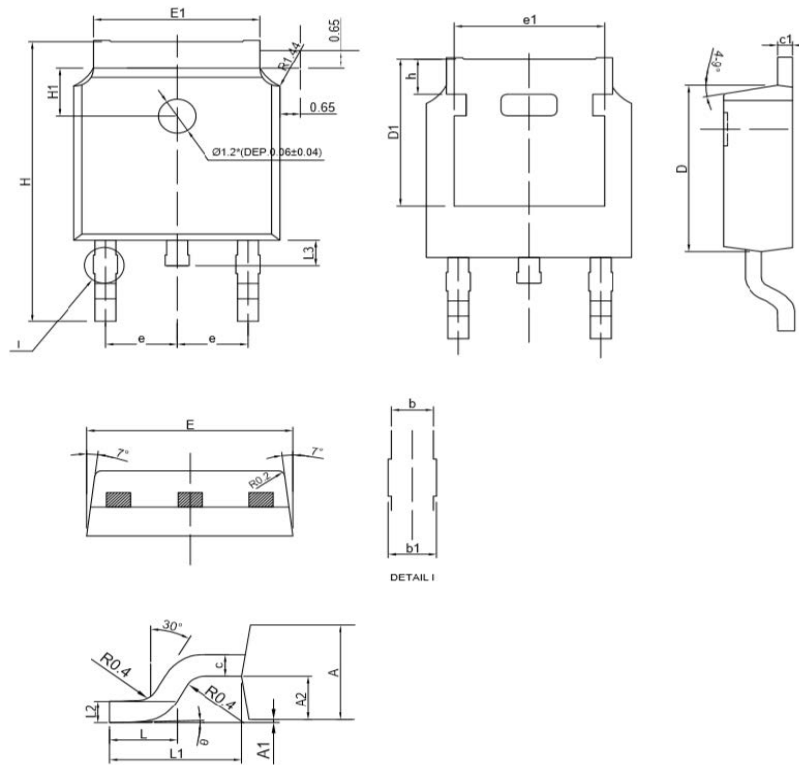


Figure 6. Capacitance

Package Information



Symbol	mm		
	Min.	Typ.	Max.
A	2.200	2.300	2.400
A1	0.000	0.075	0.15
A2	0.97	1.02	1.07
b	0.60	0.67	0.74
b1	0.65	-	1.15
c	0.508	0.528	0.548
c1	0.478	0.508	0.538
D	6.0	6.1	6.2
D1	5.15	5.25	5.35
E	6.5	6.6	6.7
E1	5.184	5.334	5.484
e	2.286BSC		
e1	4.806	4.826	4.846
H	9.8	10.0	10.2
H1	1.5	1.6	1.7
h	1.15	1.25	1.35
L	1.4	1.5	1.6
L1	2.888REF		
L2	0.51BSC		
L3	0.8	0.9	1.0
θ	0°	-	10°

Version1: TO252-G package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO252-G	2500	1	2500	6	15000

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