TSF65R140SD

650V N-Channel MOSFET

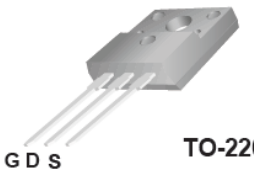
Description

The 65R140 is power MOSFET using Truesemi's advanced super junction technology that can realize very low on-resistance and gate charge. It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

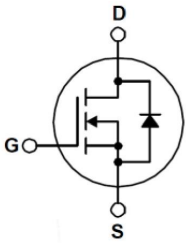
Features

• 22A,650V,Max.RDS(on)=0.14Ω @ VGS =10V

• Super_Junction technology
• Much lower Ron*A performance for On-state efficiency
•Much lower FOM for fast switching efficiency



TO-220F



Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter		Value	Units
V_{DSS}	Drain-Source Voltage		650	V
V_{GS}	Gate-Source Voltage		± 30	V
I_D	Drain Current	T_C = 25℃	22	A
		T_C = 100℃	14	A
I_{DM}	Pulsed Drain Current (TC = 25°C, tp limited by Tjmax)		88	A
E_{AS}	Avalanche energy, single pulse (L=30mH, Rg=30Ω)		300	mJ
P_D	Power Dissipation (T_C = 25℃)		20	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃

Thermal Resistance Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance,Junction-to-Case.Max	6.23	℃/W
$R_{\theta JA}$	Thermal Resistance,Junction-to-Ambient.Max	64	℃/W

Electrical Characteristics T_C=25 ℃ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 uA	3.0	--	5.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 11 A	--	0.11	0.14	Ω
g_{fs}	Forward transfer conductance	V_{DS} = 20V, I_D =11A	--	16.5	--	S
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	650	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =650V, V_{GS} = 0 V	--	--	5	uA
		V_{DS} =650 V, T_C = 150℃	--	220	--	uA
I_{GSSF}	Gate-Body Leakage Current,Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current,Reverse	V_{GS} =- 30 V, V_{DS} = 0 V	--	--	-100	nA
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 100V, V_{GS} = 0 V, f = 1.0 MHz	--	1595	--	pF
C_{oss}	Output Capacitance		--	90	--	pF
C_{rss}	Reverse Transfer Capacitance		--	1.6	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	T_j=25°C, V_{GS}=10V, I_D=11A, V_{DS}=400V, R_g=27Ω	--	60	--	ns
t_r	Turn-On Rise Time		--	61	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	140	--	ns
t_f	Turn-Off Fall Time		--	31	--	ns
R_G	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	--	9.8	--	Ω
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=480V, I_D=11A	--	46	--	nC
Q_{gs}	Gate-Source Charge		--	13.9	--	nC
Q_{gd}	Gate-Drain Charge		--	24	--	nC
Source-Drain Diode Maximum Ratings and Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage	I_S =11A, V_{GS} = 0 V	0.6	0.86	1.1	V
t_{rr}	Reverse Recovery Time	Isd=11A dI/dt=100A/us, Vds=400V	--	120	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.63	--	uC

Typical Performance Characteristics

Fig 1. Output Characteristics (Tj=25℃)

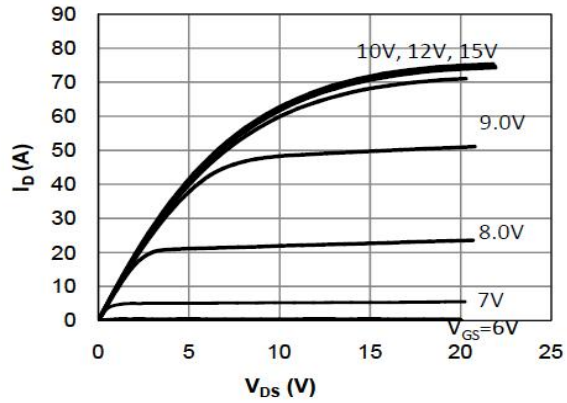


Fig 2. Output Characteristics (Tj=150℃)

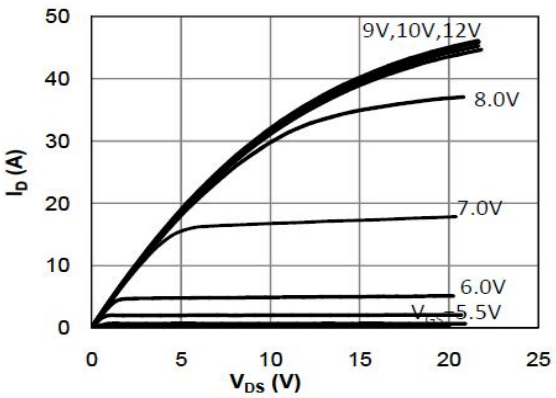


Fig 3: Transfer Characteristics

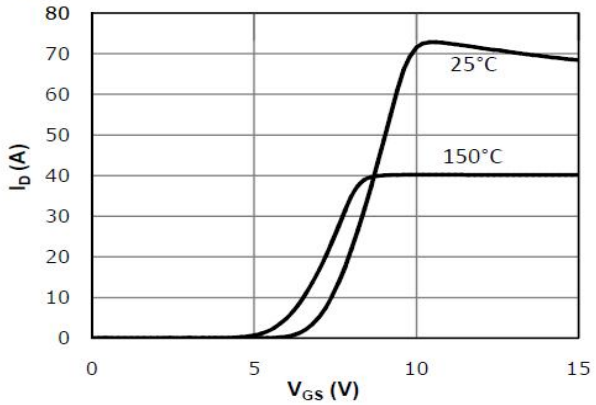


Fig 4: V_{TH} Vs Tj Temperature Characteristics

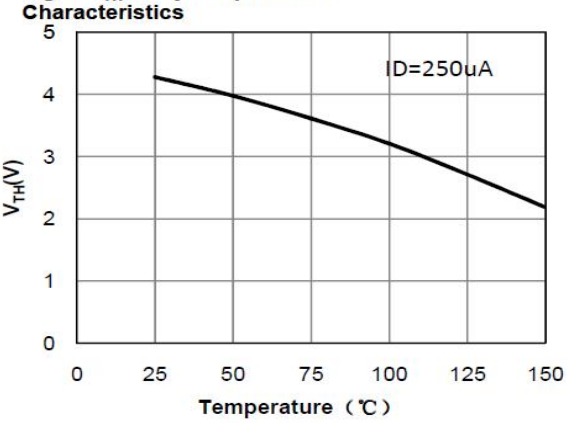


Fig 5: Rdson Vs Ids Characteristics(Tc=25℃)

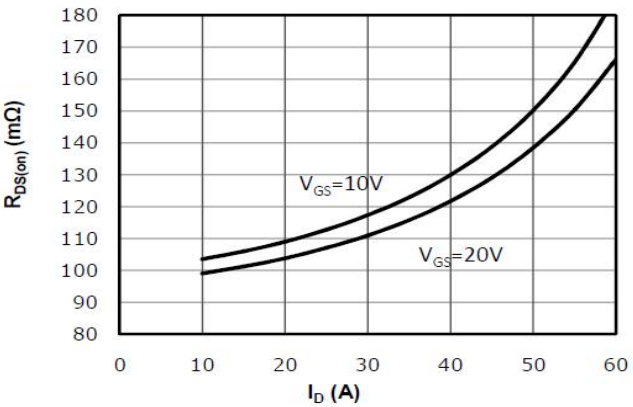


Fig 6: Rds(on) vs. Temperature

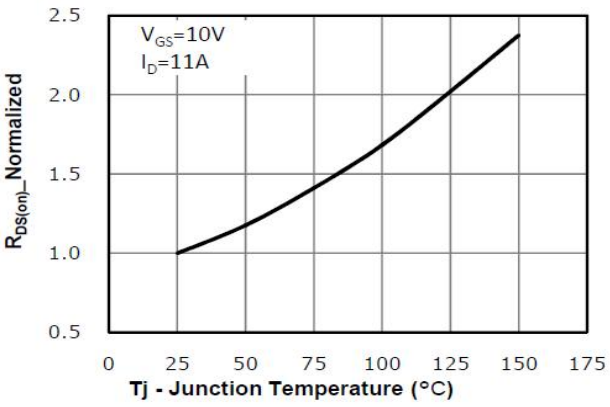


Fig 7: BVDSS vs. Temperature

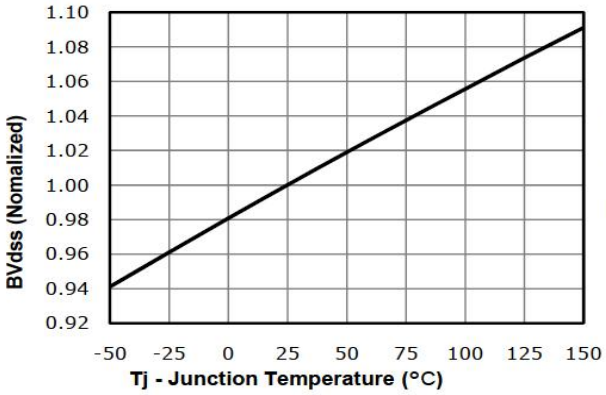


Fig 8: Rds(on) vs Gate Voltage

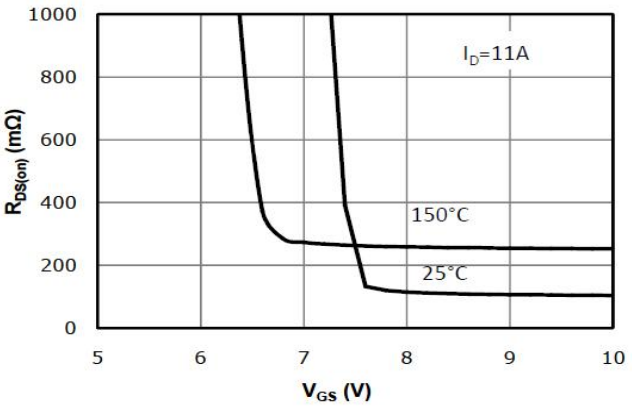


Fig 9: Body-diode Forward Characteristics

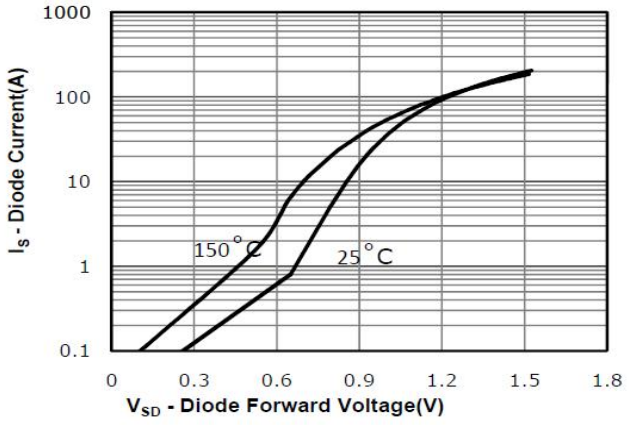


Fig 10: Gate Charge Characteristics

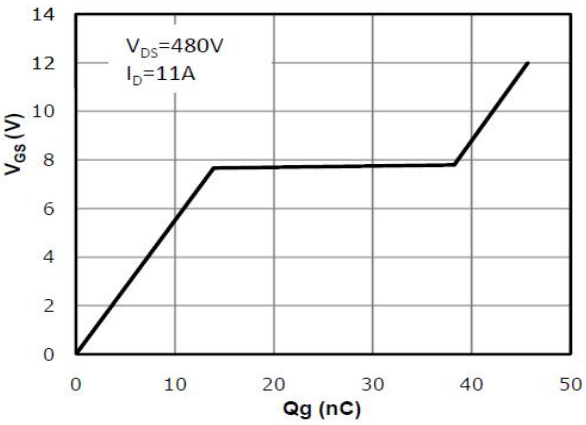


Fig 11: Capacitance Characteristics

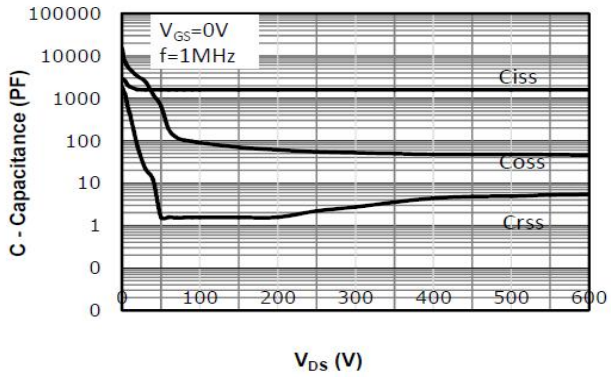


Fig 12: Safe Operating Area

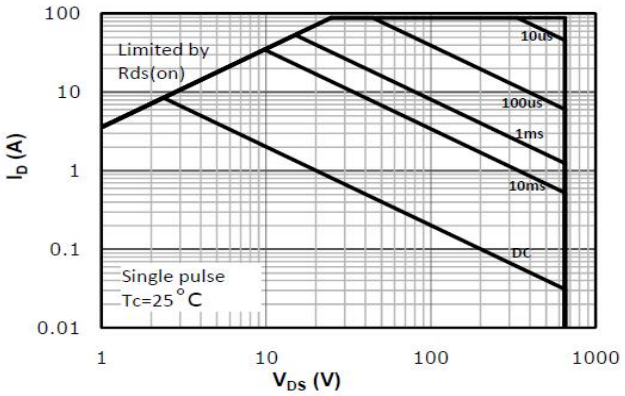
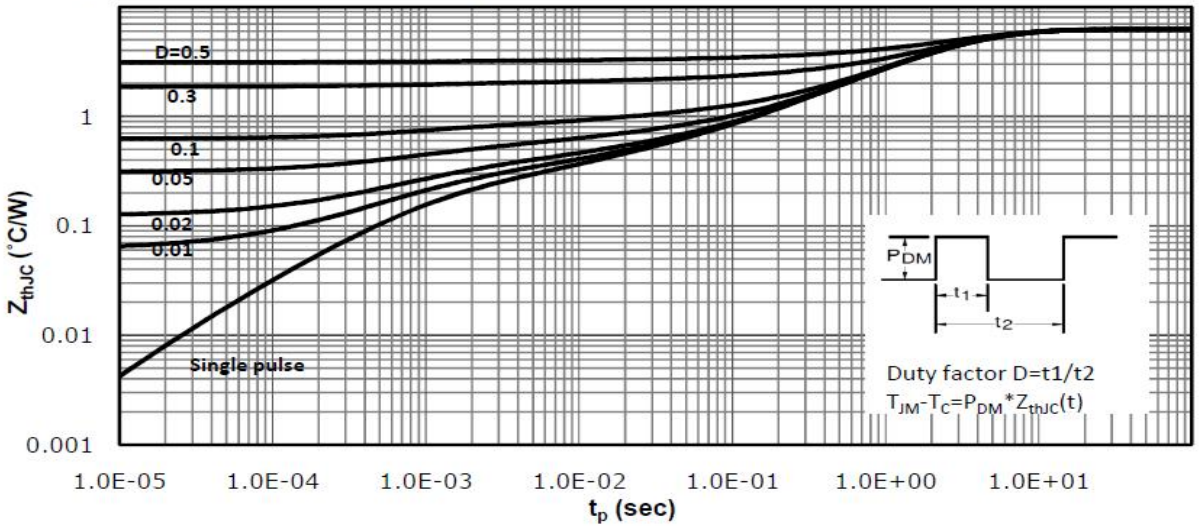
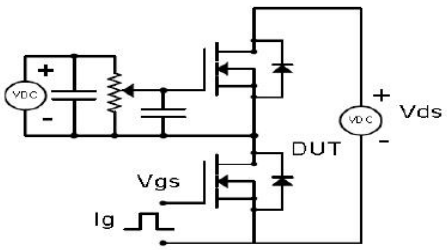
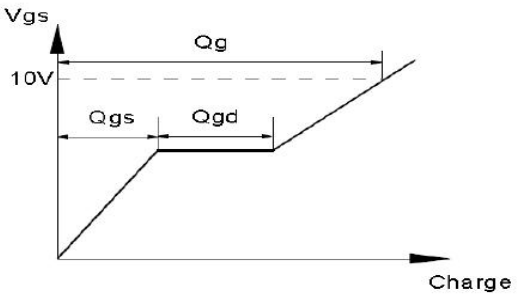


Fig 13: Max. Transient Thermal Impedance

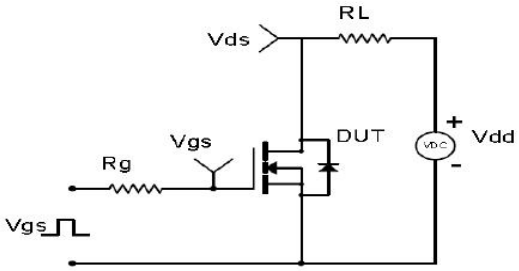


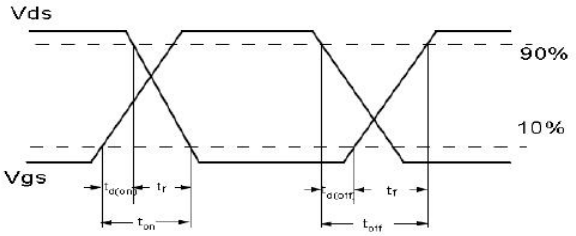
Gate Charge Test Circuit & Waveform



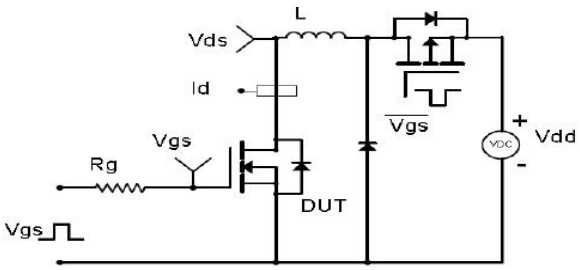


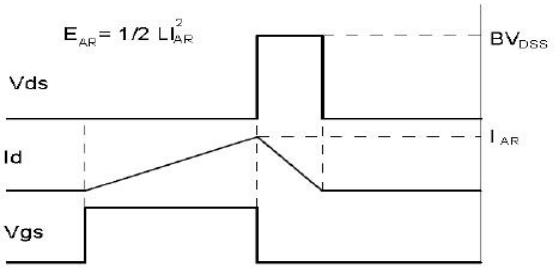
Resistive Switching Test Circuit & Waveforms





Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms