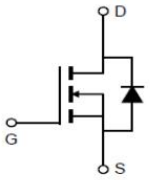
LH65R170

650V Super-Junction MOSFET

•General Description

The SJ MOSFET LH65R170 has the low $R_{DS(on)}$, low gate charge,fast switching and excellent avalanche characteristics.This device offers extremely fast and robust body diode,and is suitable for telecom and power supplies.



VDS =650V

$R_{DS(ON)}$ =170mΩ

ID =20A

TO-247

■ RoHS COMPLIANT

•Features

■Much lower Ron*A performance for On-state efficiency
■Much lower FOM for fast switching effciency

•Application

■LED/LCD/PDP TV and monitor Lighting
■Solar/Renewable/UPS-Micro Inverter System
■Power Supplies

•Ordering Information:

Part number	LH65R170
Package	TO-247
Basic ordering unit (pcs)	330
Normal Package Material Ordering Code	LH65R170T2-TO247-TU
Halogen Free Ordering Code	LH65R170T2-TO247-TU-HF

•Absolute Maximum Ratings（TC =25℃）

PARAMETER		SYMBOL	Value		UNIT
Drain-Source Breakdown Voltage		BV_{DSS}	650		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	TC = 25°C	I_D	20		A
	TC = 100°C		12		
Pulsed drain current (TC = 25°C, tp limited by Tjmax)[1]		I_D pulse	60		A
Single Pulse Avalanche Energy[1]		I_{AR}	3.5		A
Single Pulse Avalanche Energy[2]		E_{AS}	484		mJ
Repetitive Avalanche Energy[1]		E_{AR}	0.7		mJ
Power Dissipation(TC=25℃)		P_D	TO-220:151	TO-220F:34	W
Operating Temperature and Storage Temperature Range		T_J/T_{STG}	-55~+150		℃
MOSFET dv/dt ruggedness, V_{DS}=0…480V		dv/dt	50		V/ns
Reverse diode dv/dt, V_{DS}=0…480V,I_{SD}≤I_D		dv/dt	15		V/ns

●Electronic Characteristics

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D=250uA	650	--	--	V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=VGS,I_D=250uA	2.5	--	4.5	V
Drain-source On Resistance[3]	$R_{DS(ON)}$	V_{GS} =10V, I_D=7.5A	--	0.15	0.17	Ω
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V,V_{GS}=0V,T_J=25℃	--	--	1	uA
		V_{DS}=650V,V_{GS}=0V,T_J=125℃	--	--	100	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30	--	--	±100	nA
Forward Transconductance[3]	R_G	f=1.0MHz open drain	--	--	12	Ω
Input Capacitance	Ciss	V_{GS} = 0V, V_{DD} = 520V f = 1.0MHz	--	1724	--	pF
Output Capacitance	Coss		--	61	--	
Reverse transfer Capacitance	Crss		--	6	--	
Turn-on delay time	Td(on)	I_D = 20A, V_{DD} = 400V R_G = 25Ω	--	15	--	nS
Rise time	Tr		--	59	--	
Turn -Off Delay Time	Td(off)		--	121	--	
Fall time	Tf		--	44	--	
Total Gate Charge	Qg	I_D =20A, V_{DS} = 520V V_{GS} = 10V	--	38.5	---	nC
Gate-to-Source Charge	Qgs		--	8	--	
Gate-to-Drain Charge	Qgd		--	15	---	
Continuous Diode Forward Current	I_S		--	--	20	A
Pulsed Diode Forward Current	I_{SM}		--	--	60	A
Diode Forward Voltage	V_{SD}	Tj=25°C, Is=20A V_{GS} =0V	--	0.9	1.2	V
Reverse Recovery Time	trr	V_{RR}=400V, If=Is di_F/dt=100A/μs	--	423	--	ns
Reverse Recovery Charge	Qrr		--	5.3	--	uC
Peak Reverse Recovery Current	I_{RRM}		--	25	--	A

●Thermal Characteristics

PARAMETER	SYMBOL	MAX		UNIT
		TO-220F	TO-220	
Thermal Resistance Junction-case	Rth_{JC}	3.7	0.83	℃/W
Thermal Resistance Junction-ambient	Rth_{JA}	80	62	℃/W

Notes:

1.Repetitive Rating: Pulse width limited by maximum junction temperature.

2. I_{AS} = 1.8A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C

3. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

●Typical Characteristics T_J=25ºC,unless otherwise noted

Figure 1. Output Characteristics

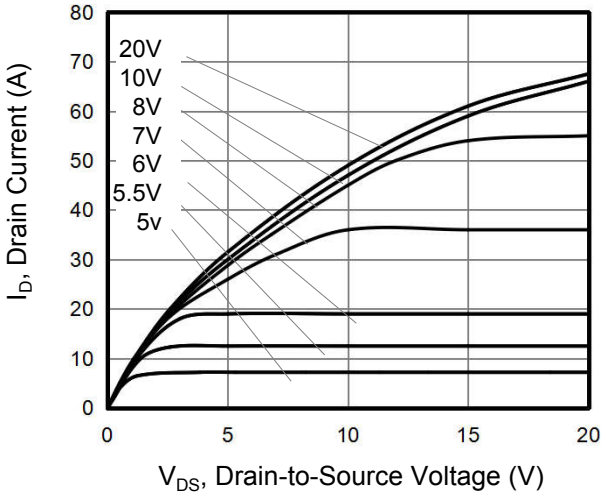


Figure 2. Transfer Characteristics

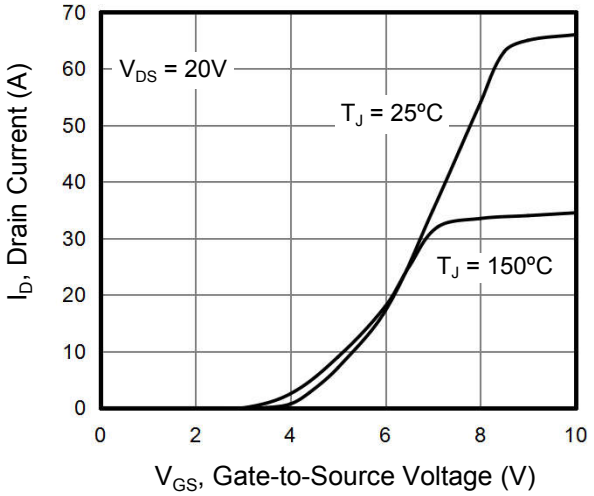


Figure 3. On-Resistance vs. Drain Current

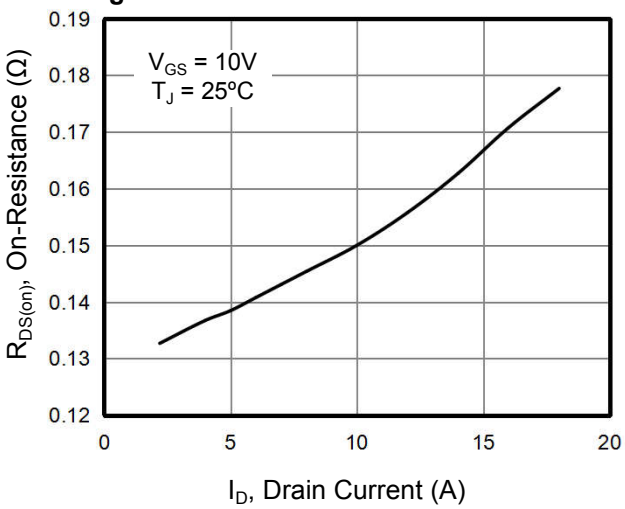


Figure 4. Capacitance

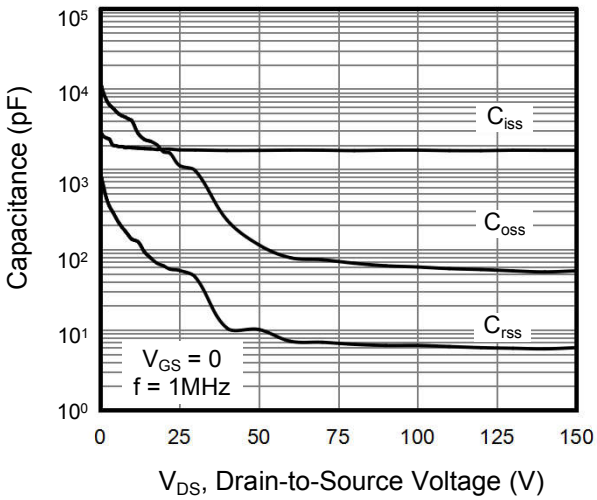


Figure 5. Gate Charge

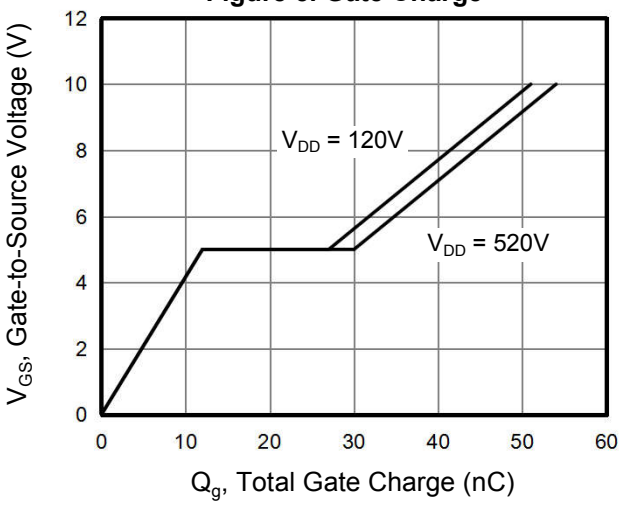
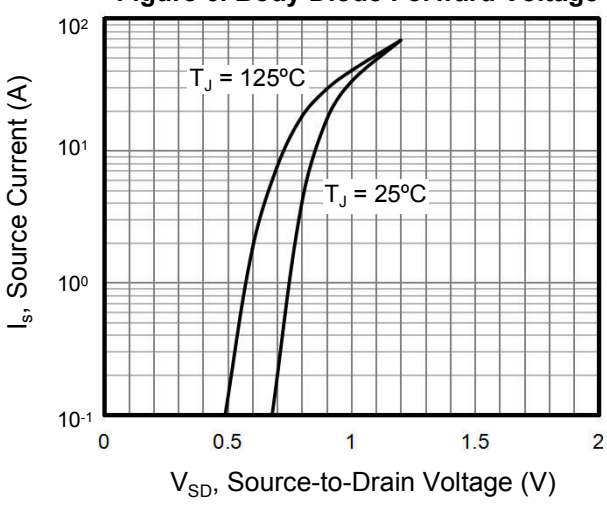


Figure 6. Body Diode Forward Voltage



●Typical Characteristics(Cont.)

Figure 7. On-Resistance vs. Junction Temperature

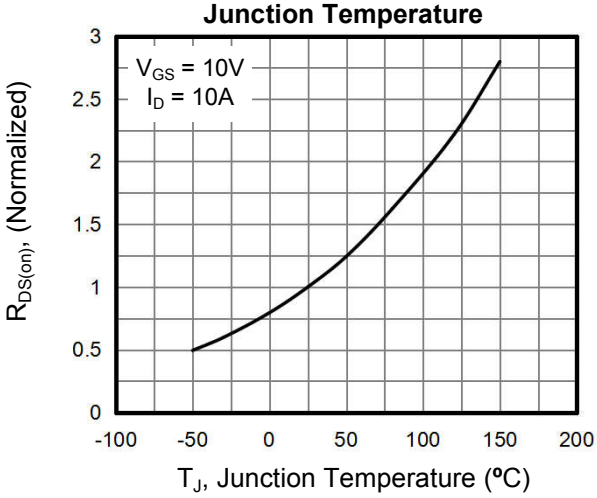


Figure 8. Threshold Voltage vs. Junction Temperature

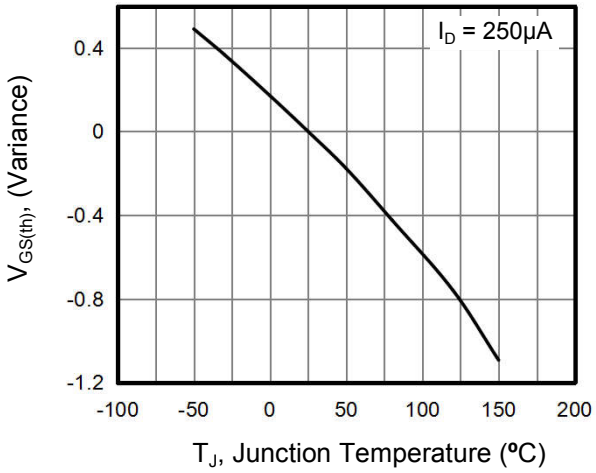


Figure 9. Transient Thermal Impedance TO-220

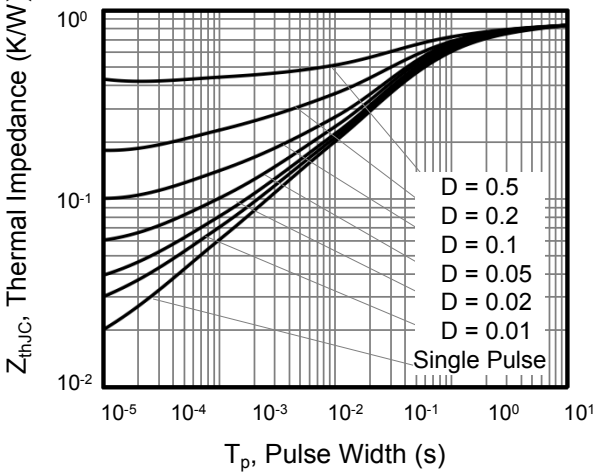


Figure 10. Transient Thermal Impedance TO-220F

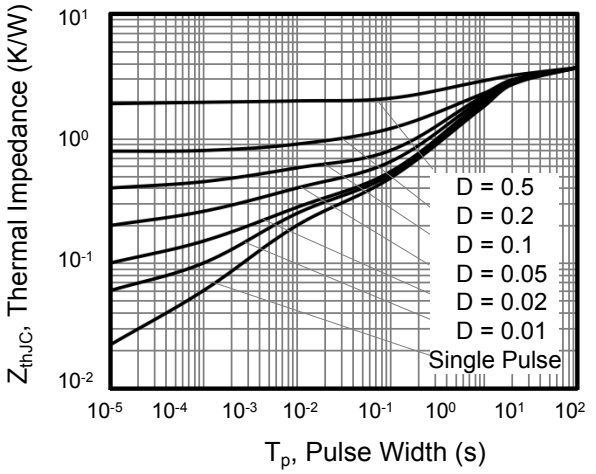


Figure 12. Safe operation area for TO-220

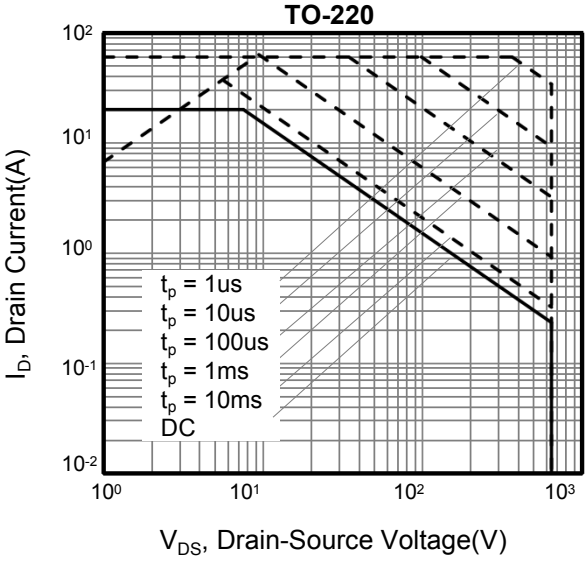
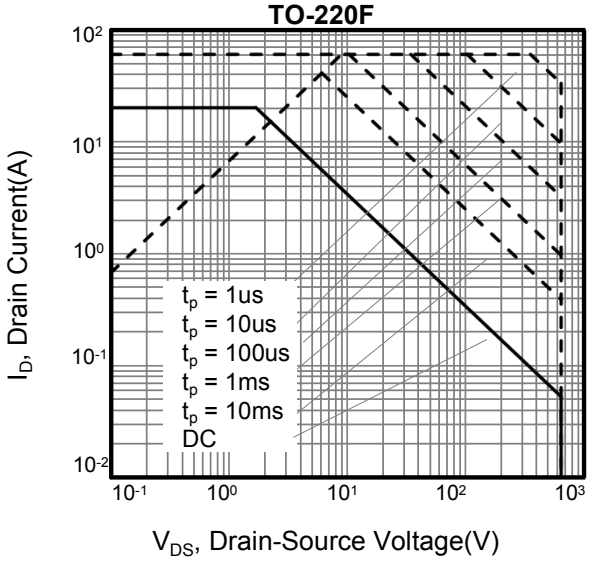


Figure 13. Safe operation area for TO-220F



●Test Circuit and Waveform

Figure A：Gate Charge Test Circuit and Waveform

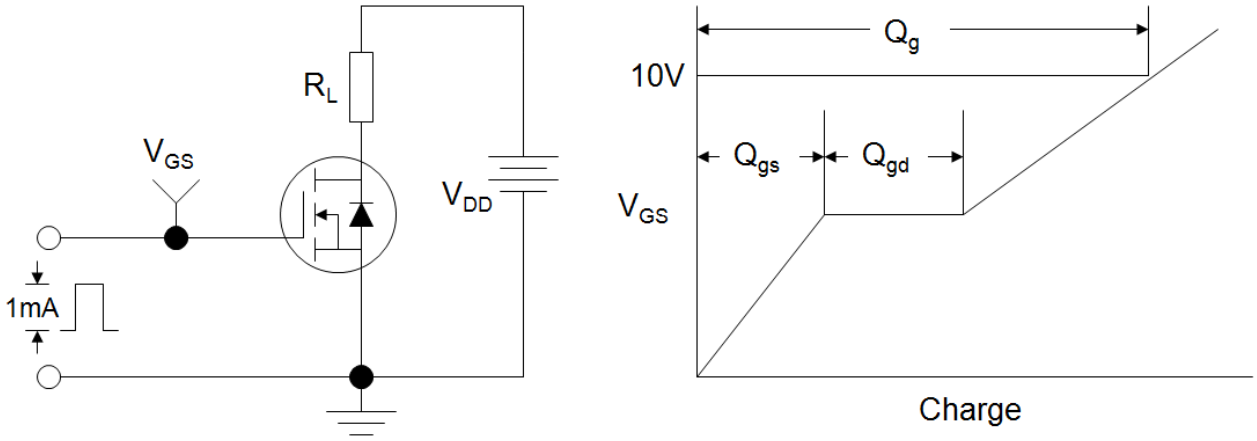


Figure B：Resistive Switching Test Circuit and Waveform

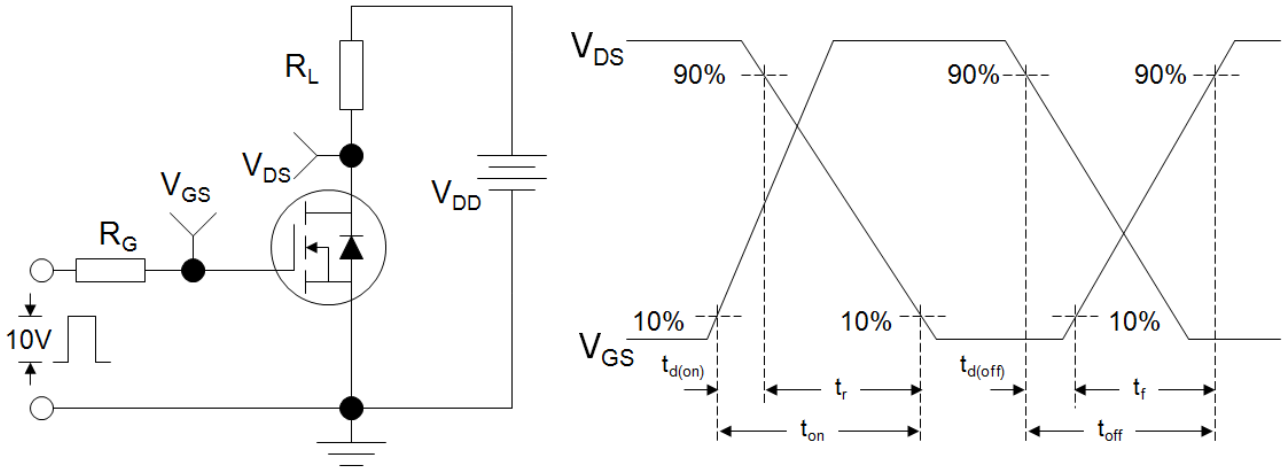
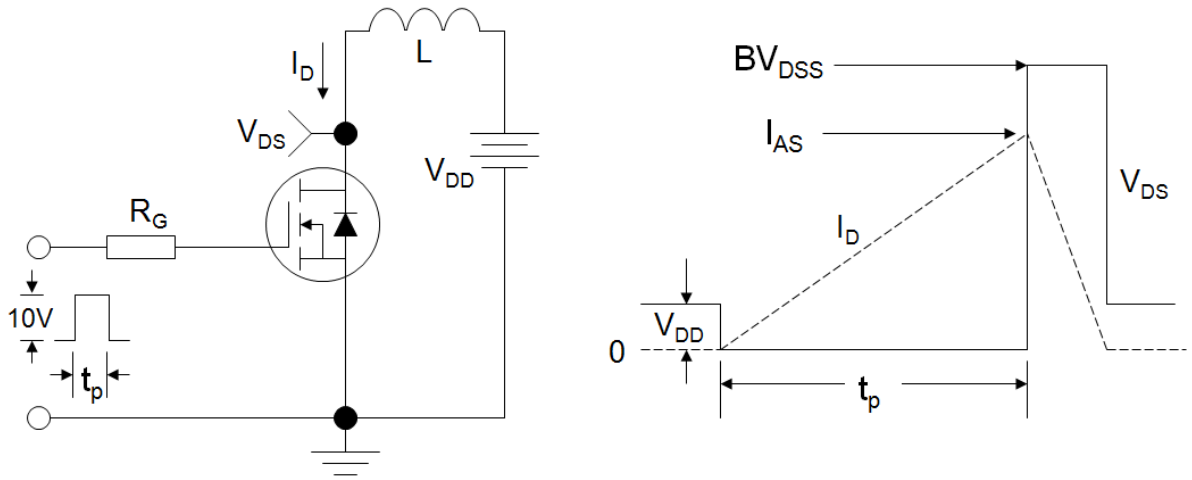


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



●Dimensions (TO-247)

UNIT:mm

SYMBOL	min	max	SYMBOL	min	max
A	15.60	16.00	G2	1.95	2.25
B	20.80	21.20	N	5.25	5.65
C	4.85	5.15	L1	4.00	4.30
D	1.85	2.15	L	19.60	20.40
E	1.00	1.40	I	2.30	2.50
F	0.50	0.70	ΦP	3.30	3.70
G1	3.00	3.30