

● General Description

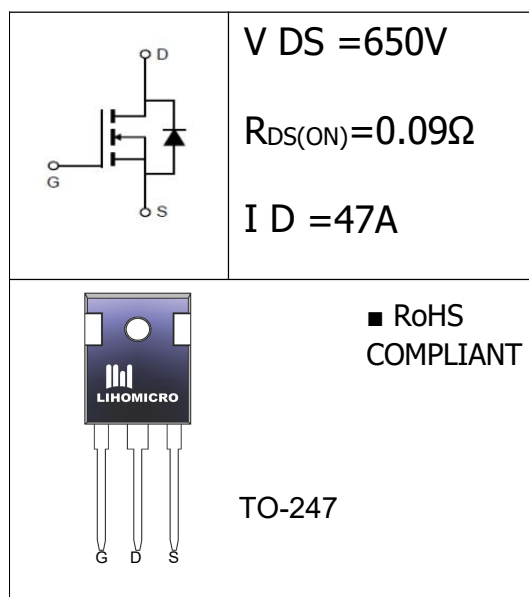
The SJ MOSFET LH65R090FD has the low $R_{DS(on)}$, low gate charge, fast switching and excellent avalanche characteristics. This device offers extremely fast and robust body diode, and is suitable for telecom and power supplies.

● Features

- RoHS
- Much lower $R_{on} \cdot A$ performance for On-state efficiency
- Much lower FOM for fast switching efficiency

● Application

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



● Ordering Information:

Part number	LH65R090FDT2
Package	TO-247
Basic ordering unit (pcs)	450
Normal Package Material Ordering Code	LH65R090FDT2-T0247-TU
Halogen Free Ordering Code	LH65R090FDT2-T0247-TU-HF

● Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current $T_c = 25^\circ\text{C}$ (Silicon limit) $T_c = 100^\circ\text{C}$ (Silicon limit)	I_D	47 28	A
Pulsed drain current ($T_c = 25^\circ\text{C}$, t_p limited by T_{jmax}) ¹	$I_{D \text{ pulse}}$	141	A
Power Dissipation ($T_c = 25^\circ\text{C}$)	P_D	298	W
Operating Junction Temperature	T_J	$-55 \dots +150$	$^\circ\text{C}$
Storage Temperature	T_{STG}	$-55 \dots +150$	$^\circ\text{C}$
Single Pulse Avalanche Energy ²	E_{AS}	1160	mJ
Repetitive Avalanche Energy ²	E_{AR}	1.76	mJ

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = 12\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0		5.0	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V,$ $T_J=25^\circ C$ $T_J=150^\circ C$			1	uA
					100	
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=+30V, V_{DS}=-30V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=24A$		0.08	0.09	Ω
Rate resistance	R_G	f=1.0MHz open drain		0.8		Ω

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=100V$ $F=1MHz$		3000		pF
Output capacitance	C_{oss}			2500		
Reverse transfer capacitance	C_{rss}			10		
Turn -Off Delay Time	$T_d(off)$	$V_{DD}=400V,$ $I_D=47A, R_G=25\Omega$		105		nS
Turn-on delay time	$T_d(on)$			49		
Rise time	T_r			123		
Fall time	T_f			49		
Total Gate Charge	Q_g	$I_D=47A, V_{DS}=520V$ $V_{GS}=10V$		68		nC
Gate-to-Source Charge	Q_{gs}			35		
Gate-to-Drain Charge	Q_{gd}			25		
Diode Forward Voltage	V_{SD}	$I_D=47A$ $V_{GS}=0V$		0.9	1.2	V
Body Diode Reverse Recovery Time	T_{rr}	$I_F=20A, dI/dt=100A/us,$ $V_{ds}=50V$		145		nS
Body Diode Reverse Recovery Charge	Q_{rr}			3.1		nC
Peak Reverse Recovery Current	I_{rrm}			15		A

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		0.41		$^\circ C/W$
Thermal resistance, junction - ambient	R_{thJA}		62.5		$^\circ C/W$

Typical Characteristics

Figure 1. Output Characteristics

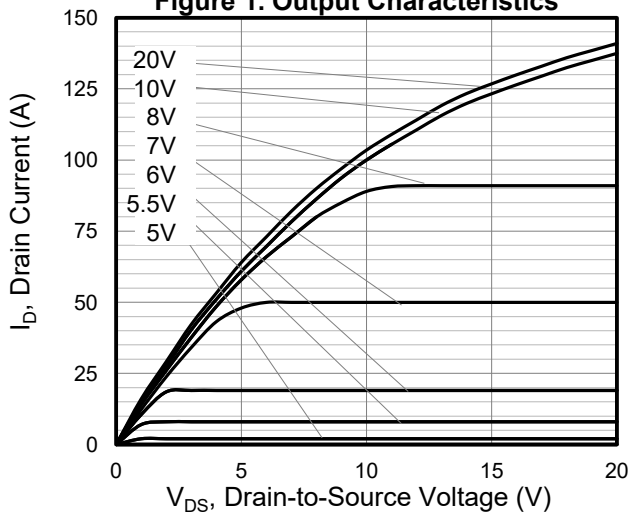


Figure 2. Transfer Characteristics

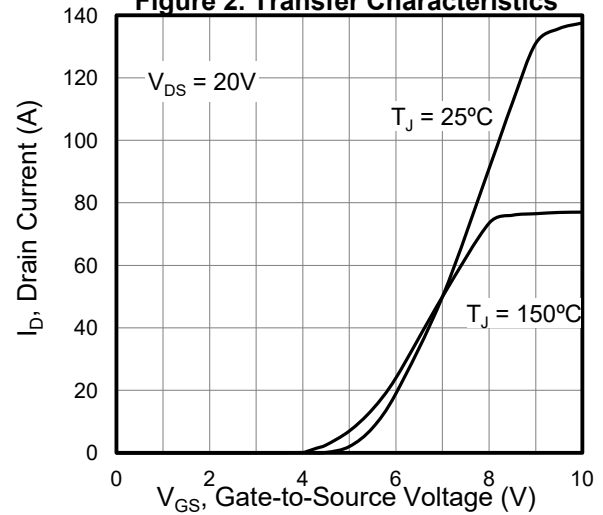


Figure 3. On-Resistance vs. Drain Current

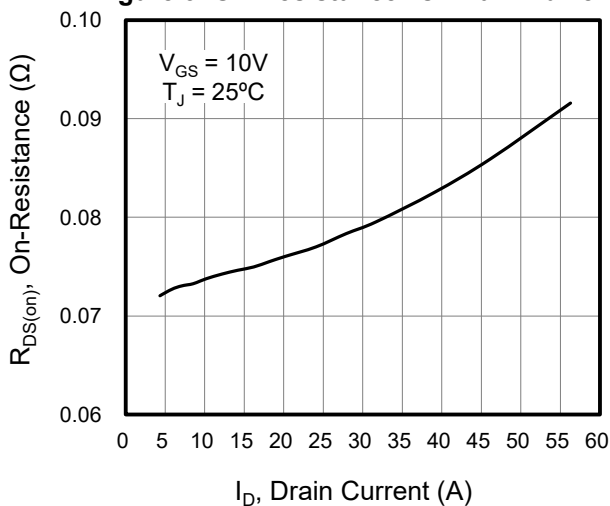


Figure 4. Capacitance

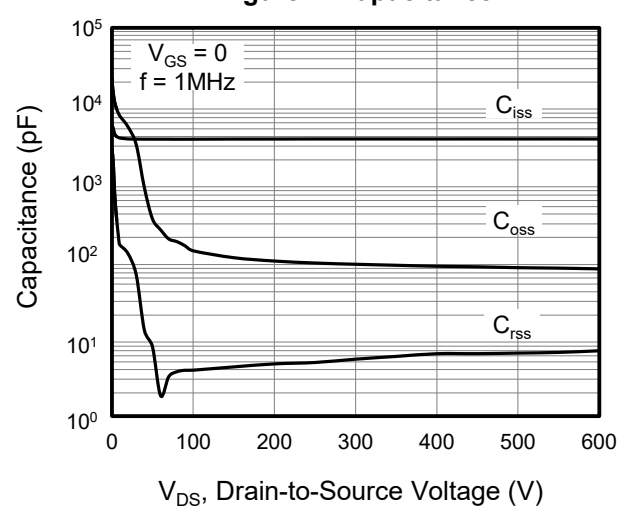


Figure 5. Gate Charge

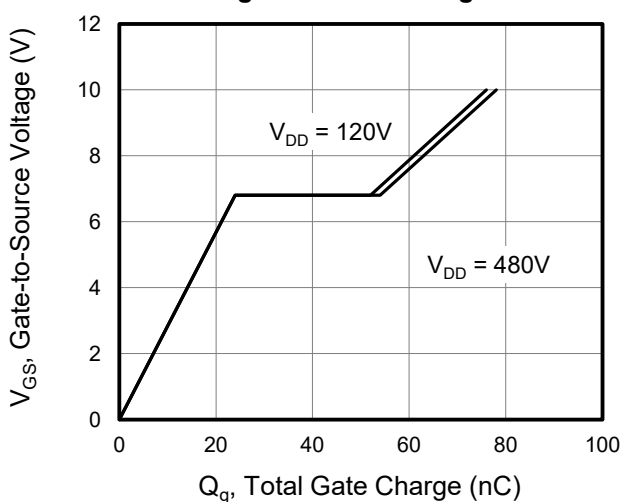
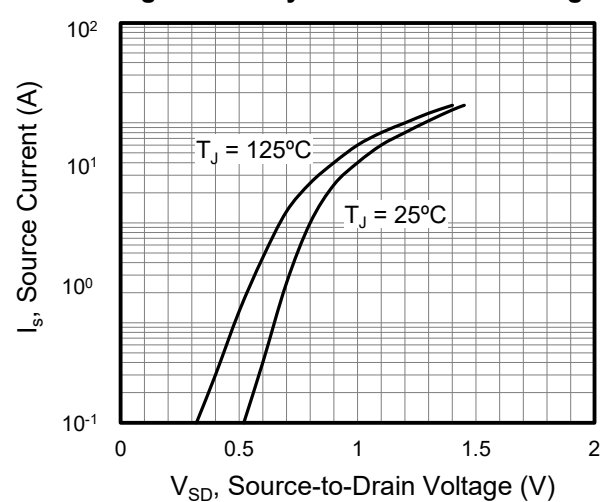


Figure 6. Body Diode Forward Voltage



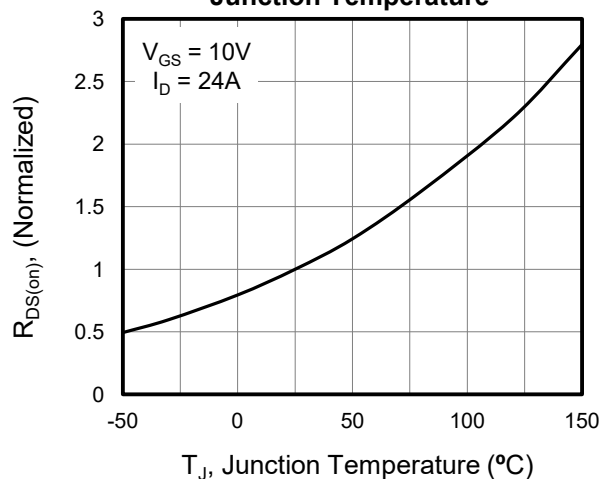
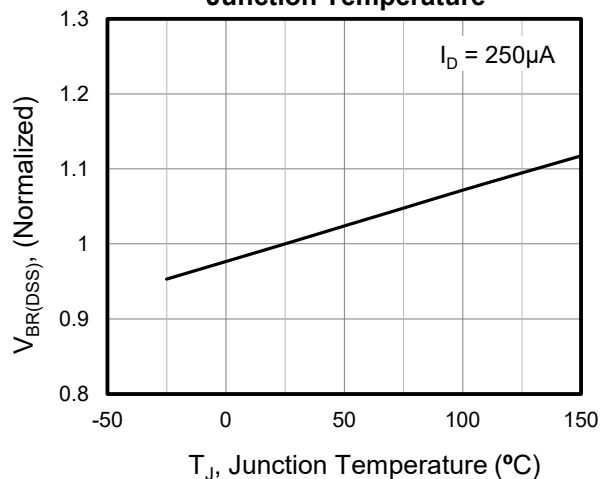
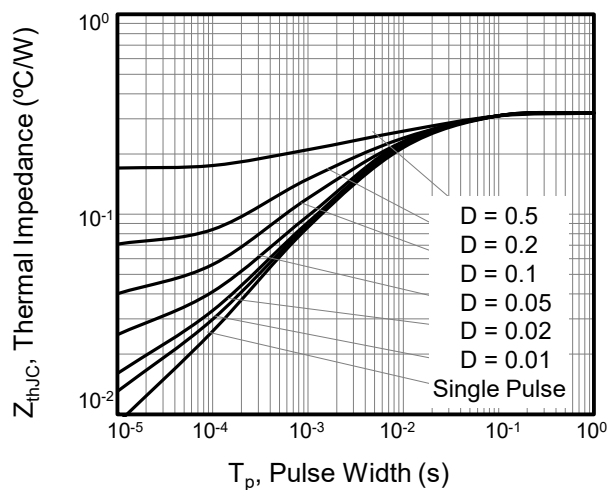
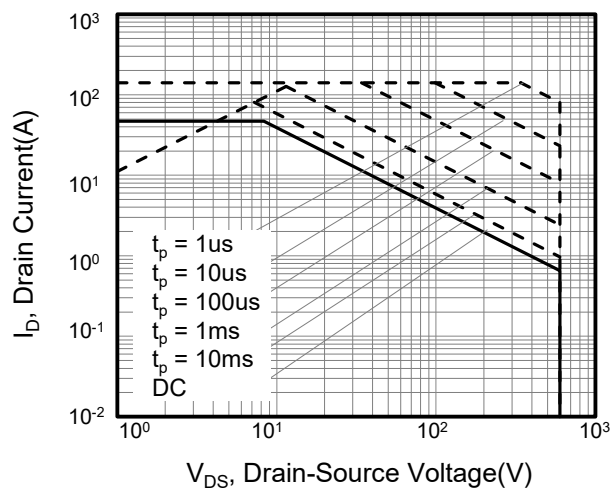
Typical Characteristics (cont.)
Figure 7. On-Resistance vs. Junction Temperature

Figure 8. Breakdown voltage vs. Junction Temperature

Figure 9. Transient Thermal Impedance for TO-247

Figure 10. Safe operation area for TO-247


Figure A: Gate Charge Test Circuit and Waveform

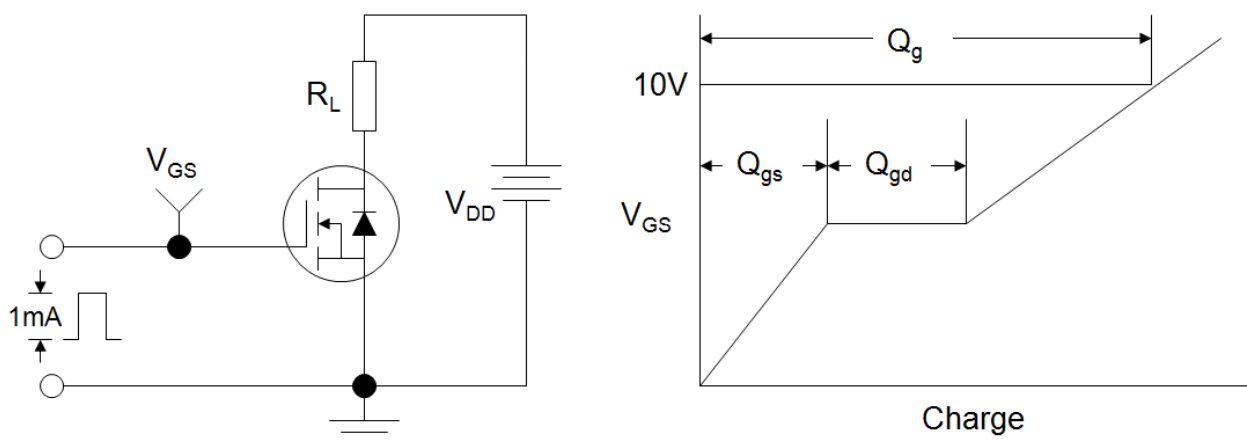


Figure B: Resistive Switching Test Circuit and Waveform

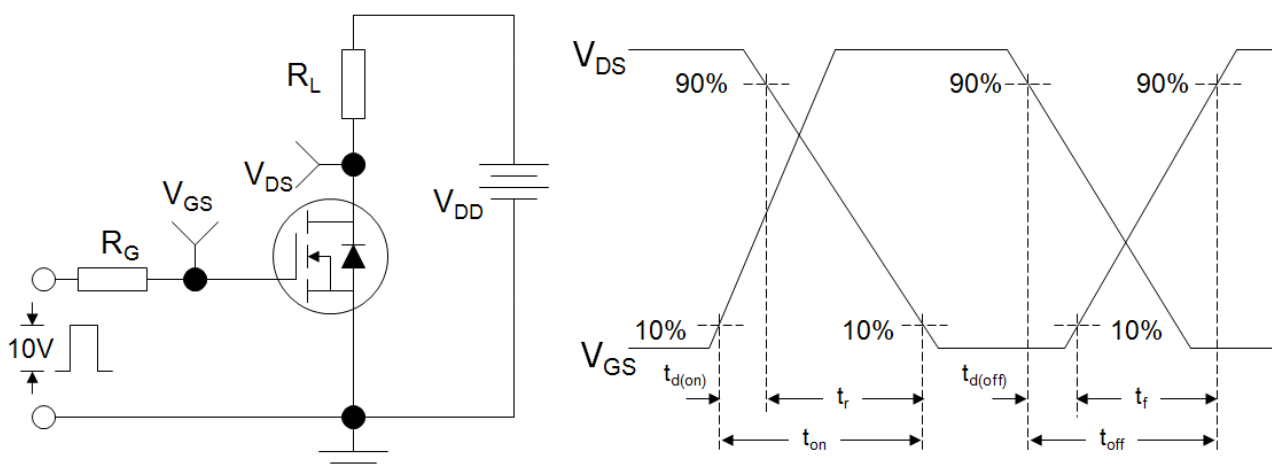
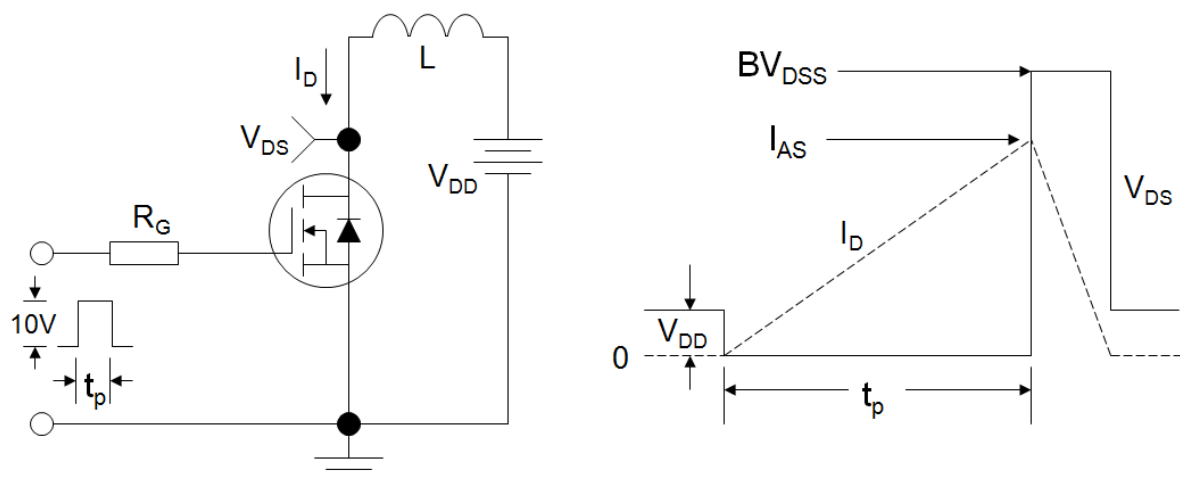


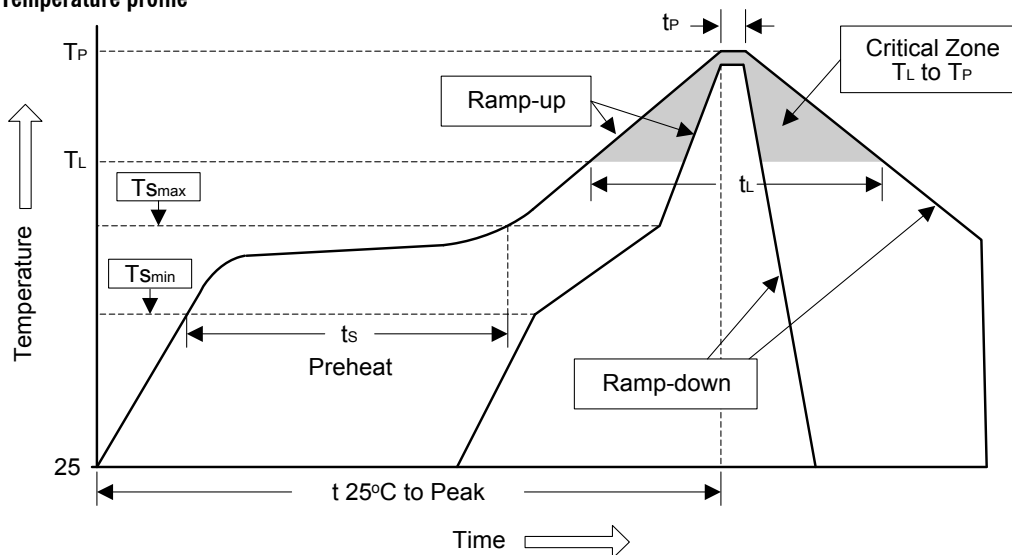
Figure C: Unclamped Inductive Switching Test Circuit and Waveform



• Soldering Methods for Lihomicro's Products

1. Storage environment: Temperature=10°C to 35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T_{Smin})	100°C	150°C
- Temperature Max (T_{Smax})	150°C	200°C
- Time (min to max) (t_s)	60 to 120 sec	60 to 180 sec
T_{Smax} to T_L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T_L)	183°C	217°C
- Time (t_L)	60 to 150 sec	60 to 150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec