

35A, 650V N-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

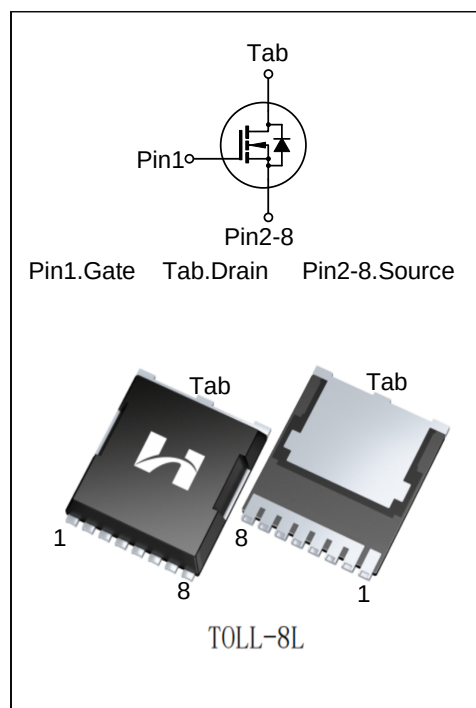
SJ-FET is new generation of high voltage MOS FET family that is utilizing an advanced charge balance mechanism for Outstanding low on-resistance and lower gate charge performance. This advanced technology has been tailored to Minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate and higher Avalanche energy. SJ-FET is suitable for various AC/DC power conversion in switching mode operation for higher efficiency.

Features

- ◆ $V_{DS}(V)=650V$, $I_D=35A$
- ◆ $R_{DS(ON)}$
TYP: $95m\Omega @ V_{GS}=10V$
MAX: $110m\Omega$

Applications

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



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SCL65R099C	TOLL-8L	SCL65R099C	Pb free	Reel

ABSOLUTE MAXIMUM RATINGS ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Drain Current	I_D	$T_C = 25^{\circ}\text{C}$	A
		$T_C = 100^{\circ}\text{C}$	
Drain Current Pulsed (Note 1)	I_{DM}	140	A
Power Dissipation($T_C=25^{\circ}\text{C}$) -Derate above 25°C	P_D	192	W
		1.53	W/ $^{\circ}\text{C}$
Single Pulsed Avalanche Energy (Note 2)	E_{AS}	605	mJ
Operation Junction Temperature Range	T_J	$-55\sim+150$	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	$-55\sim+150$	$^{\circ}\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	TL	300	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.65	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	55	$^{\circ}\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _{VDSS}	V _{GS} =0V, I _D =250μA	650	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V	--	--	1.0	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =30V, V _{DS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-30V, V _{DS} =0V	--	--	-100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	3.0	4.0	5.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =17.5A	--	95	110	mΩ
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V; f=1.0MHZ	--	1.7	--	Ω
Input Capacitance	C _{iss}	V _{DS} =200V V _{GS} =0V f=1.0MHZ	--	2983	--	pF
Output Capacitance	C _{oss}		--	81	--	
Reverse Transfer Capacitance	C _{rss}		--	5.6	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =325V R _G =1.6Ω V _{GD} =10V I _D =35A (Note 3.4)	--	28.7	--	ns
Turn-on Rise Time	t _r		--	75.1	--	
Turn-off Delay Time	t _{d(off)}		--	49.8	--	
Turn-off Fall Time	t _f		--	24.9	--	

Total Gate Charge	Q_g	$V_{DS}=520V, I_D=35A$ $V_{GS}=10V$ (Note 3.4)	--	80.2	--	nc
Gate-Source Charge	Q_{gs}		--	30.5	--	
Gate-Drain Charge	Q_{gd}		--	41.8	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	35	A
Pulsed Source Current	I_{SM}		--	--	140	
Diode Forward Voltage	V_{SD}	$I_S=35A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	T_{rr}	$I_F=35A, V_R=520V,$ $dI_F/dt=100A/\mu S$	--	115	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.63	--	μC

1. Pulse width limited by maximum junction temperature
2. $L=79mH, I_{AS}=5.0A, V_{DD}=100V, V_G=10V, R_G=25\Omega$, starting $T_J=25^\circ C$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1. On-Region Characteristics

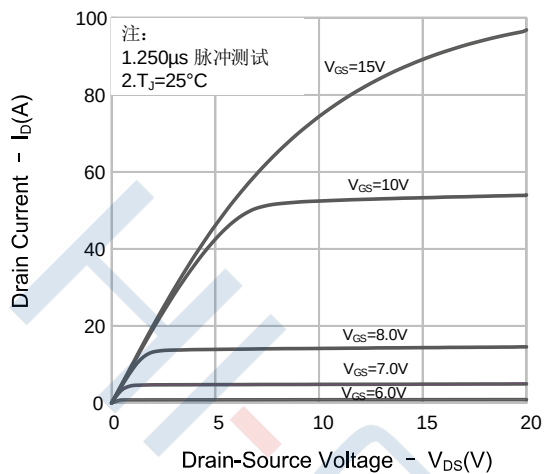


Figure 2. Transfer Characteristics

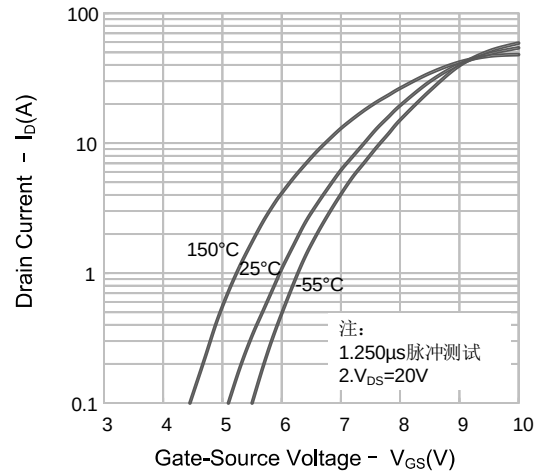


Figure 3. On-Resistance Variation vs. Drain Current

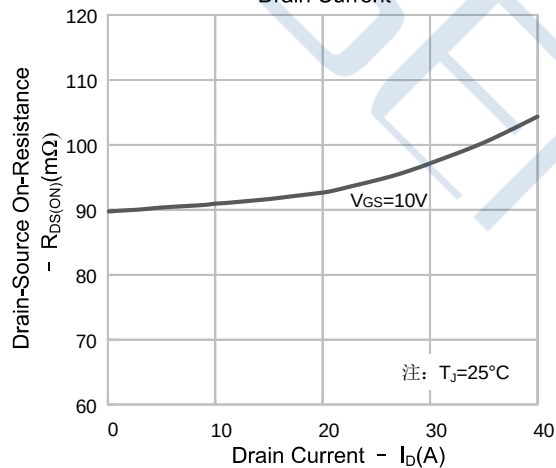


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

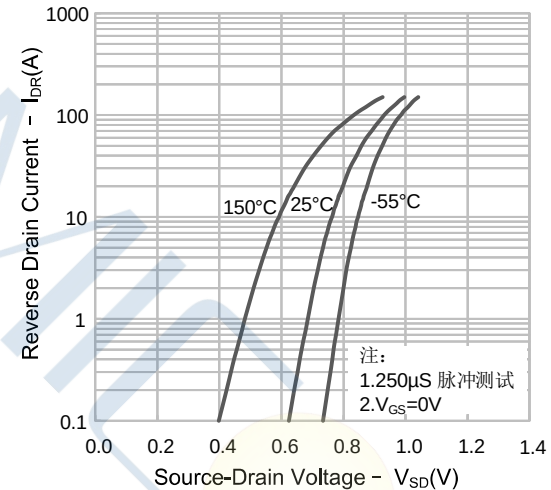


Figure 5. Capacitance Characteristics

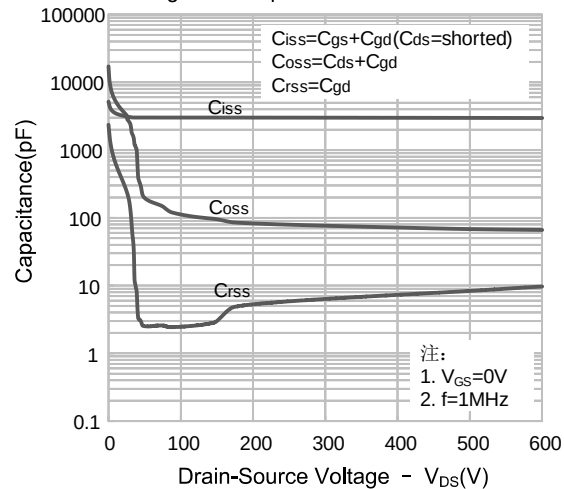
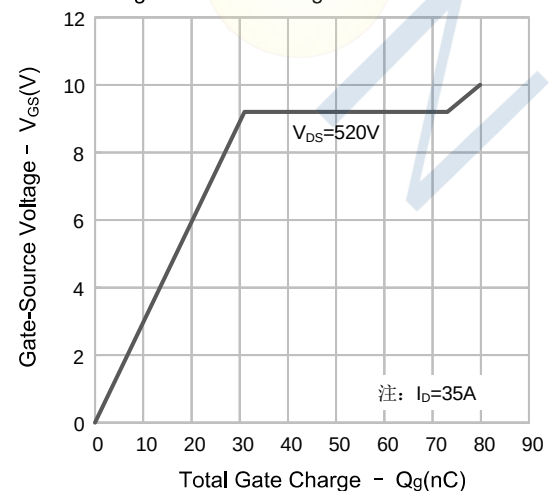


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics

Figure 7. Breakdown Voltage Variation vs. Temperature

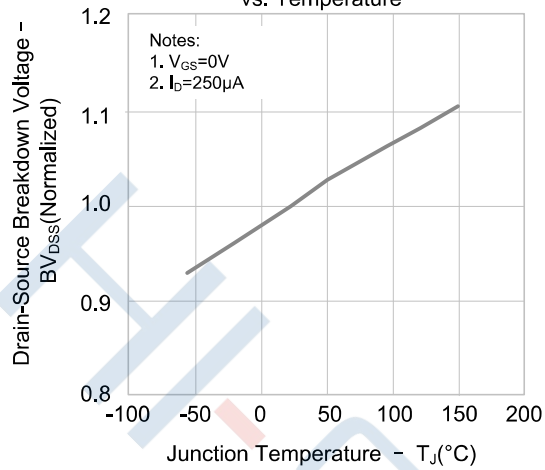


Figure 8. On-resistance Variation vs. Temperature

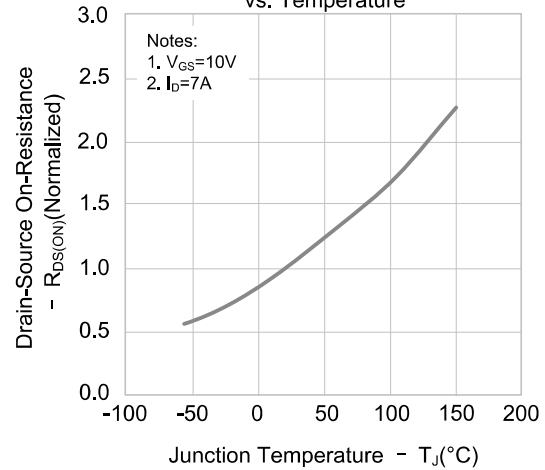
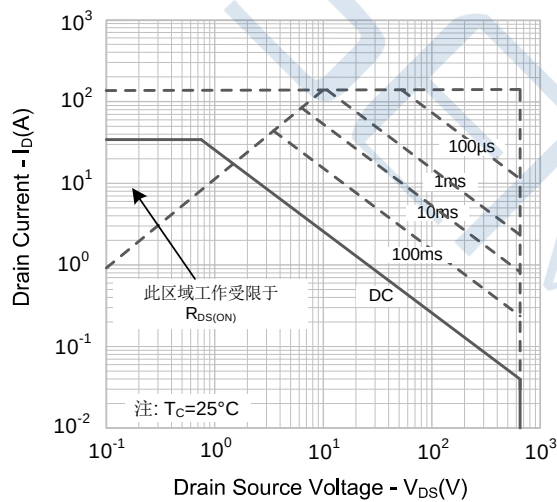
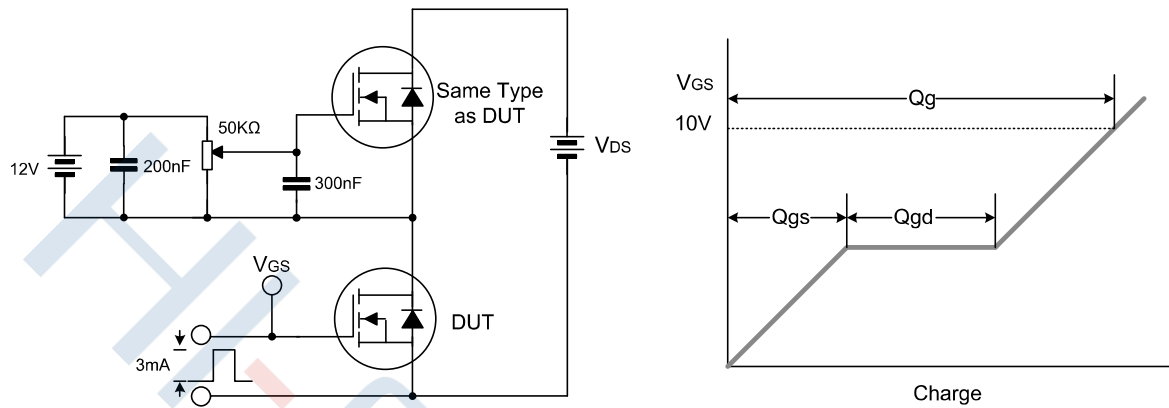


Figure 9. Max. Safe Operating Area

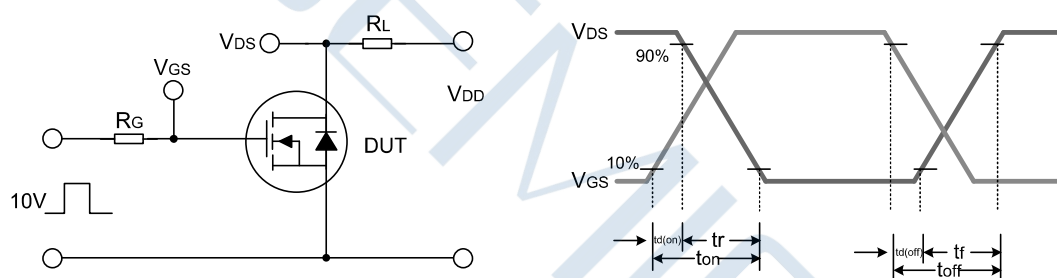


Test Circuit

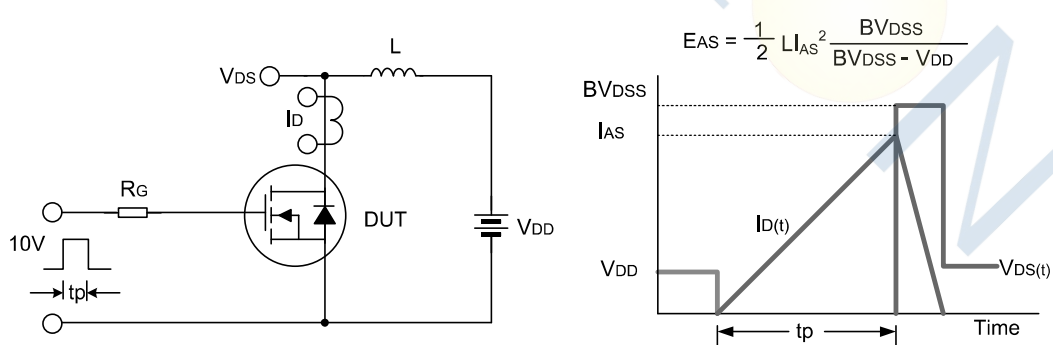
Gate Charge Test Circuit & Waveform



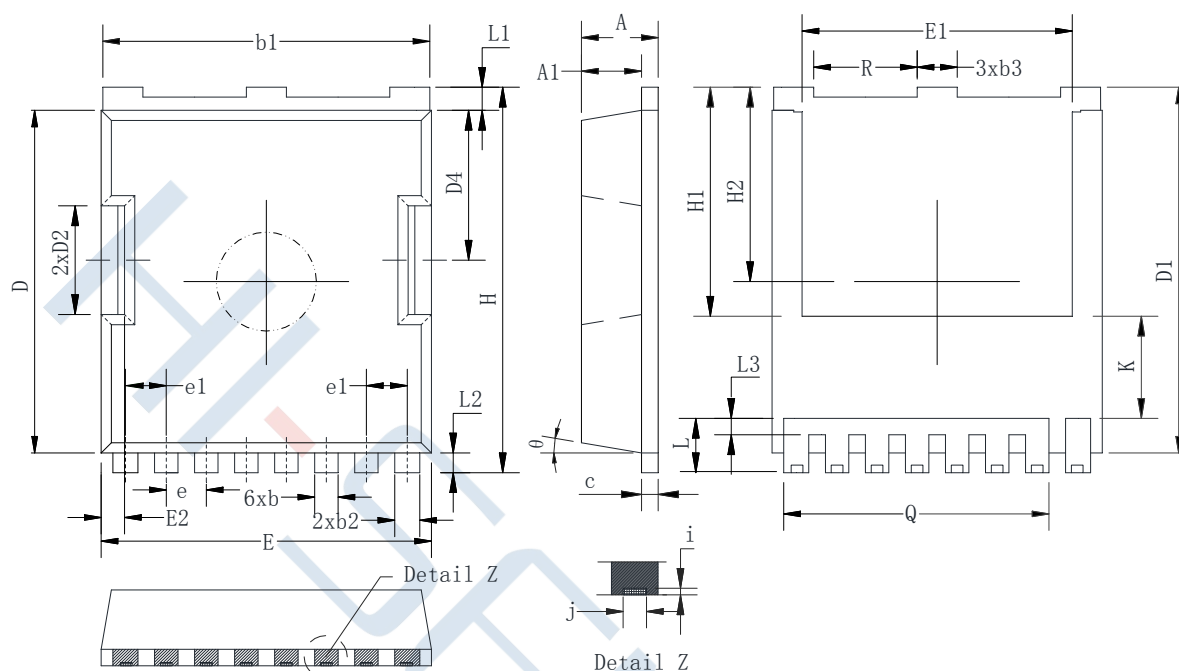
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of TO-220F-3L



Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.25	2.30	2.35	E2	0.65	0.70	0.75
A1	1.75	1.80	1.85	H	11.60	11.70	11.80
b	0.65	0.70	0.75	H1	6.95 BSC		
b_1	9.75	9.80	9.85	H2	5.90 BSC		
b_2	0.70	0.75	0.80	i	0.10 REF		
b_3	1.15	1.20	1.25	j	0.35 REF		
c	0.45	0.50	0.55	K	3.10 REF		
D	10.35	10.40	10.45	L	1.55	1.65	1.75
D_1	11.00	11.10	11.20	L_1	0.65	0.70	0.75
D_2	3.25	3.30	3.35	L_2	0.50	0.60	0.70
D_4	4.50	4.55	4.60	L_3	0.40	0.50	0.60
e	1.20 BSC			Q	7.95 REF		
e_1	1.225 BSC			R	3.05	3.10	3.15
E	9.85	9.90	9.95	θ	10°REF		
E_1	8.00	8.10	8.20				

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