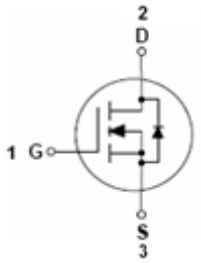
Super Junction Power MOSFET

SJ65R099FRU SJ65R099FRF

Features

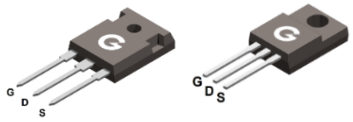
- Low power loss by high speed switching and low on-resistance
- Ultra-fast body diode
- Excellent thermal behavior
- Product validation acc. JEDEC Standard
- HBM: JESD22-A114-B: 1C
- RoHS compliant with Halogen-free

HF



Applications

- Soft switching applications
- DC-DC converters
- On-Board battery Chargers
- LED lighting



TO-247 ITO-220AB

Mechanical Data

- Case: TO-247, ITO-220AB
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
SJ65R099FRU	TO-247	30 pcs / Tube	SJ65R099FRU
SJ65R099FRF	ITO-220AB	50 pcs / Tube	SJ65R099FRF

Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	650	V
Gate-to-Source Voltage	V_{GSS}	±30	V
Continuous Drain Current (T_C = 25°C)	I_D	35	A
Continuous Drain Current (T_C = 100°C)		22	
Pulsed Drain Current (t_p = 10μs, T_C = 25°C)	I_{DM}	140	A
Single Pulse Avalanche Energy *2	E_{AS}	800	mJ
Power Dissipation (TO-247, T_C = 25°C)	P_D	208	W
Power Dissipation (ITO-220AB, T_C = 25°C)		42	
Operating Junction Temperature Range	T_J	-55 ~ +150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case (TO-247)	$R_{\theta JC}$	-	0.35	0.6	°C/W
Thermal Resistance Junction-to-Case (ITO-220AB)		-	1.9	3	°C/W
Thermal Resistance Junction-to-Air (TO-247)	$R_{\theta JA}$	-	-	40	°C/W
Thermal Resistance Junction-to-Air (ITO-220AB)		-	-	62	°C/W

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 1mA	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650V, V_{GS} = 0V	-	-	10	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±30V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *1	V_{GS} = 10V, I_D = 10A	-	80	99	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2.5	3.7	4.5	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	1.9	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 40V f = 250kHz	-	2270	-	pF
C_{OSS}	Output Capacitance		-	196	-	
C_{RSS}	Reverse Transfer Capacitance		-	6.7	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time*3	V_{DD} = 400V V_{GS} = 10V I_D = 20A R_G = 10Ω	-	65	-	ns
t_r	Turn-on Rise Time*3		-	5.5	-	
$t_{d(OFF)}$	Turn-Off Delay Time*3		-	121	-	
t_f	Turn-Off Fall Time*3		-	4.3	-	
Q_G	Total Gate-Charge	V_{DD} = 400V V_{GS} = 10V I_D = 20A	-	77.5	-	nC
Q_{GS}	Gate to Source Charge		-	24.3	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	34.5	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *1	I_{SD} = 20A, V_{GS} = 0V	-	0.9	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 20A, V_R = 400V d_I/d_t = 100A/μs	-	170	-	ns
Q_{rr}	Reverse Recovery Charge		-	1.1	-	μC

Notes:
1. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
2. The E_{AS} data shows Max. rating. The test condition is V_{DD} = 100V, V_{GS} = 15V, L = 50mH
3. Guaranteed by design, not subject to production

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

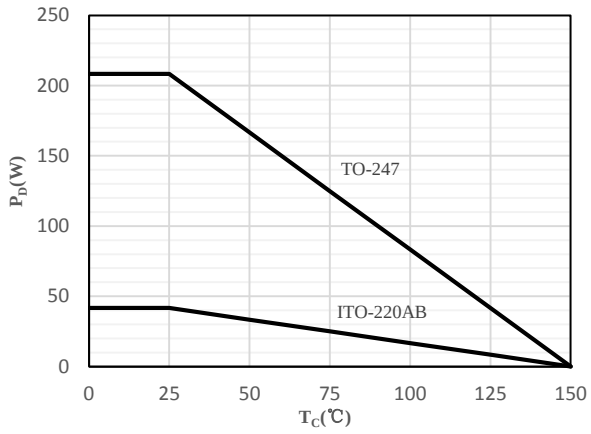


Fig 1 Power Dissipation

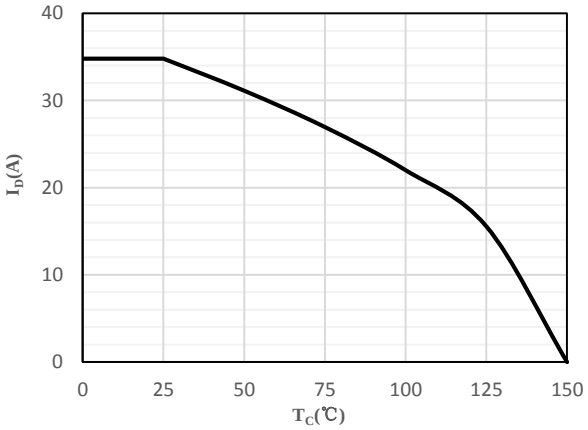


Fig 2 Drain Current

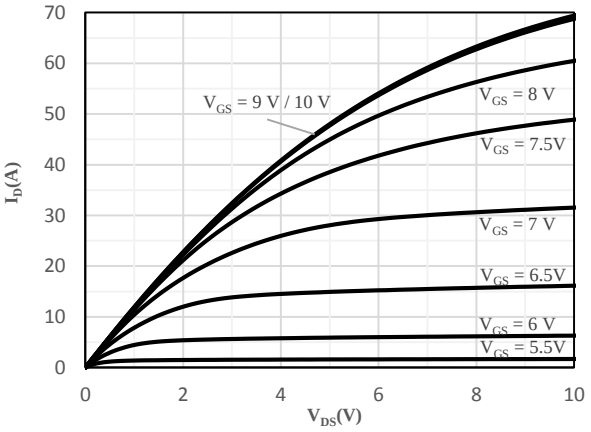


Fig 3 Typical Output Characteristics

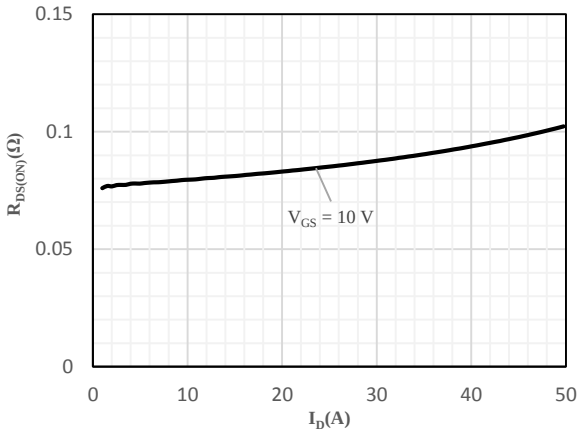


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

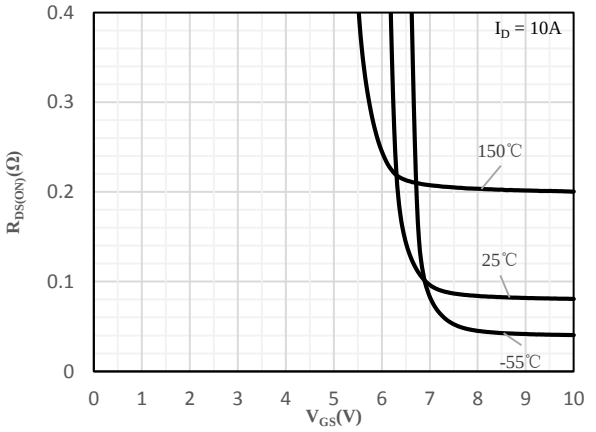


Fig 5 On-Resistance vs. Gate-Source Voltage

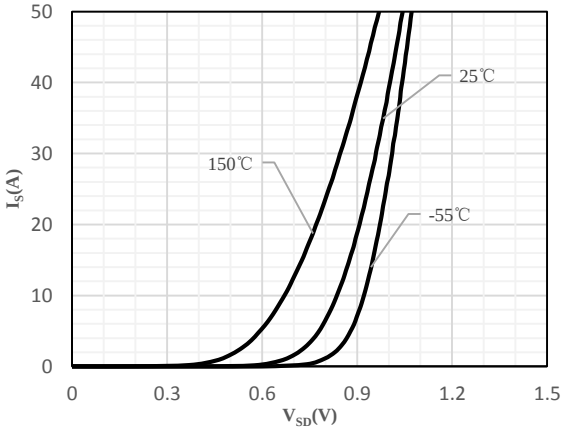


Fig 6 Body-Diode Characteristics

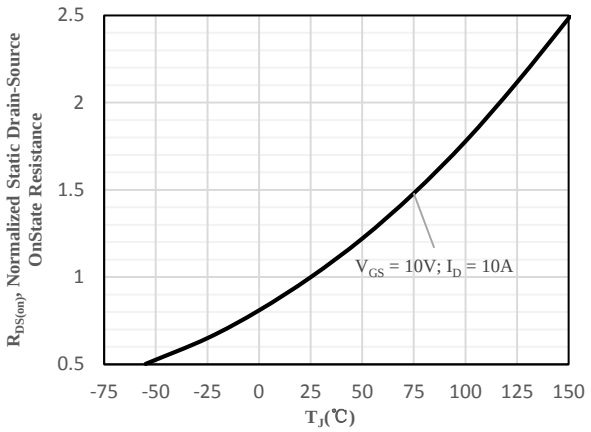


Fig 7 Normalized On-Resistance vs. Junction Temperature

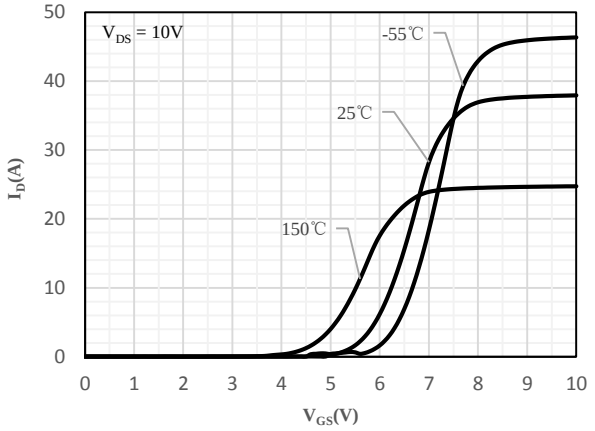


Fig 8 Transfer Characteristics

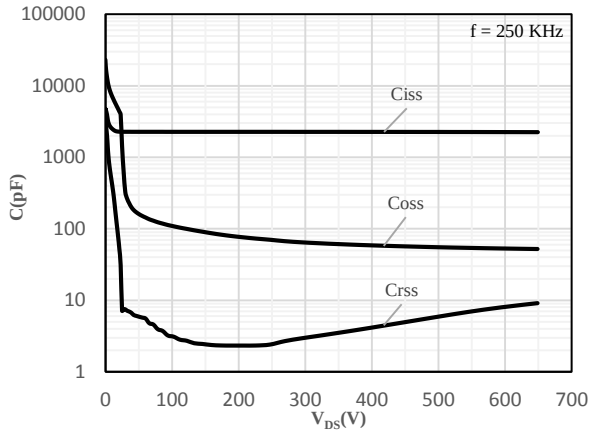


Fig 9 Capacitance Characteristics

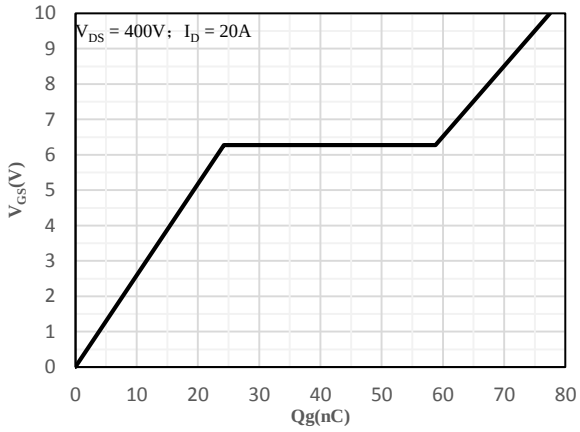


Fig 10 Gate-Charge Characteristics

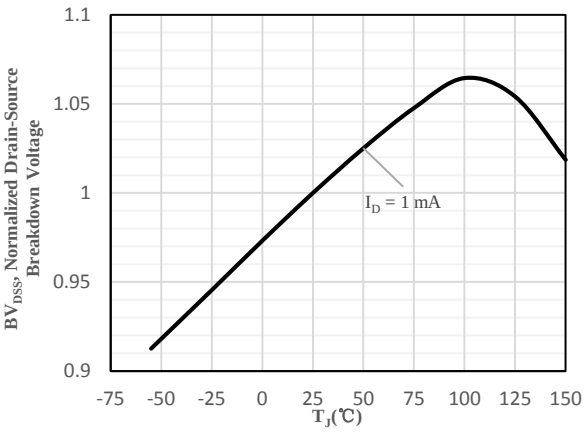


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

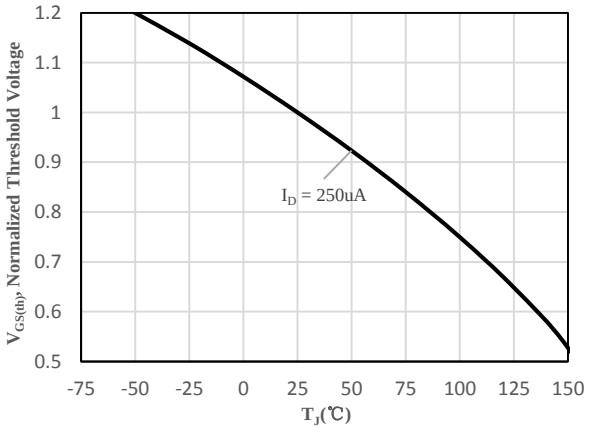


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

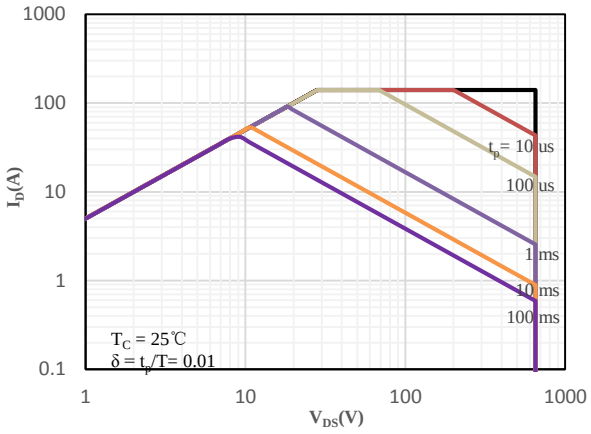


Fig 13 Safe Operating Area (TO-247)

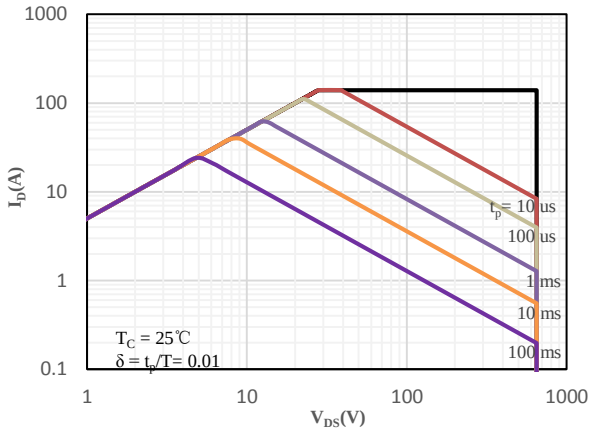


Fig 14 Safe Operating Area (ITO-220AB)

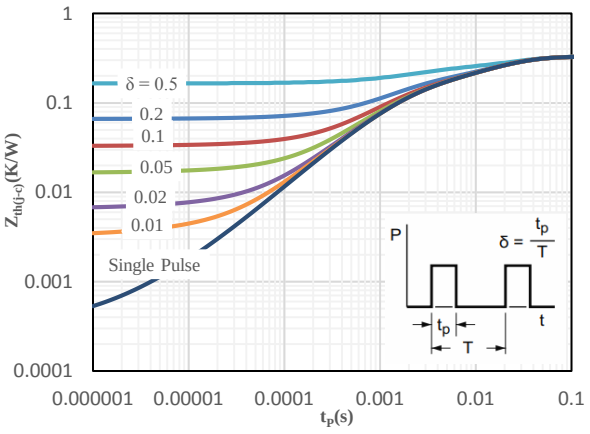


Fig 15 Maximum transient thermal impedance (TO-247)

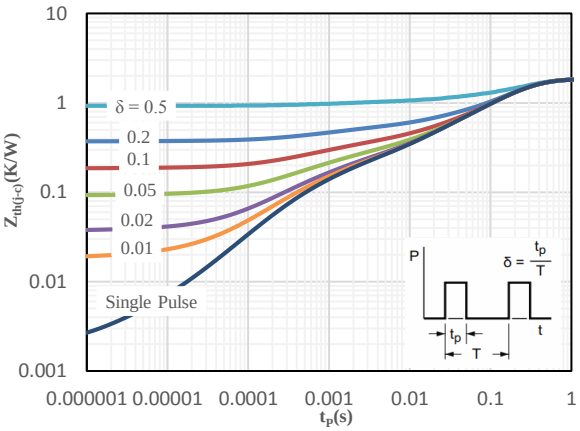
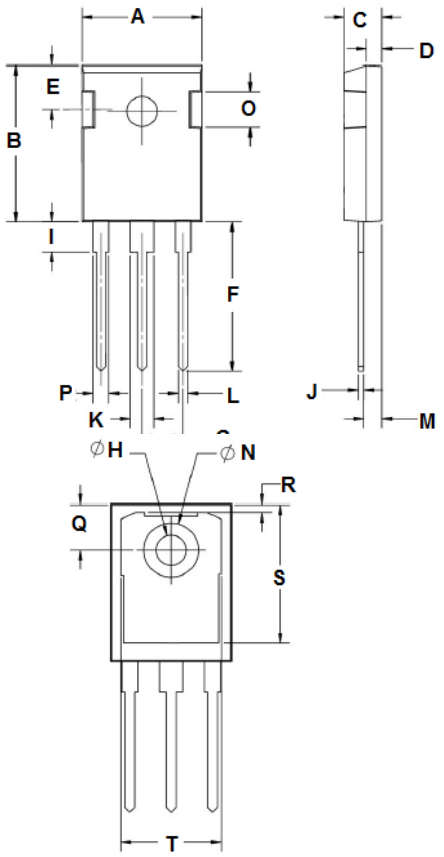
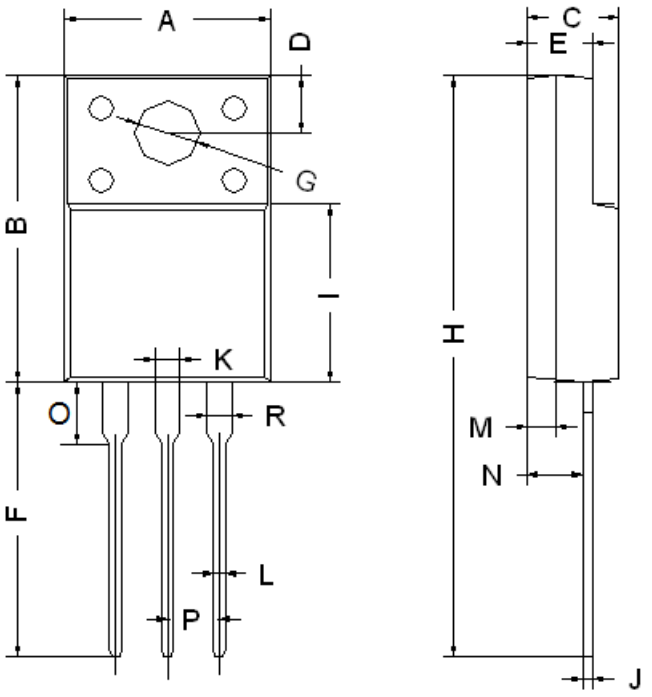


Fig 16 Maximum transient thermal impedance (ITO-220AB)

Package Outline Dimensions (Unit: mm)



TO-247		
Dimension	**Min.**	**Max.**
A	15.50	16.10
B	20.70	21.30
C	4.70	5.30
D	1.80	2.20
E	5.20	5.80
F	19.70	20.30
G	5.20	5.60
H	3.30	3.70
I	3.90	4.30
J	0.50	0.70
K	2.80	3.20
L	1.00	1.40
M	2.20	2.60
N	7.00	7.20
O	4.90	5.30
P	1.80	2.20
Q	5.70	5.90
R	0.80	1.20
S	17.00	17.80
T	13.60	14.20



ITO-220AB		
Dimension	**Min.**	**Max.**
A	9.90	10.30
B	14.80	15.20
C	4.30	4.70
D	2.50	2.90
E	2.80	3.30
F	13.00	13.60
G	3.10	3.30
H	28.00	28.60
I	7.90	8.90
J	0.40	0.60
L	0.70	0.90
M	1.30	1.50
N	2.60	2.80
O	2.60	3.10
P	2.45	2.65
K/R	1.10	1.30