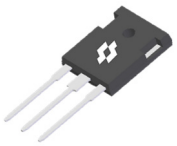
SMJ60R038CFY

600V Super Junction N-Channel Power MOSFET

Product Summary

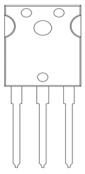
V_{DS}	$R_{DS(ON)\_MAX}$	I_{D_MAX}
600 V	38 mΩ @V_{GS} = 10V	70 A

TO247-3L

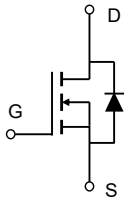


Top View

Bottom View



PIN Configuration
(Top View)



Schematic Diagram

Features

- Low On-Resistance
- Fast Switching Capability
- 100% ΔVDS & UIS & Rg Tested

RoHS HALOGEN FREE

Applications

- LED Lighting
- Charger and Adapter
- PC and Telecom Power

Mechanical Data

- Green Molding Compound
- Moisture Sensitivity: Level 3 per J-STD-020
- UL Flammability Classification Rating 94V-0

Ordering Information

Orderable Part Number	Package Type	Device Marking	Form	Quantity (pcs)
SMJ60R038CFY	TO247-3L	60R038CF	Tube	30

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

Parameter		Symbol	Value	Unit
Drain - Source Voltage		V_{DS}	600	V
Gate - Source Voltage		V_{GS}	±30	V
Continuous Drain Current (V_{GS} = 10V) (1)	T_C = 25°C	I_D	70	A
	T_C = 100°C		50.0	A
Pulsed Drain Current (2)		I_{DM}	210	A
Single Pulse Avalanche Energy (3)		E_{AS}	540	mJ
Single Pulse Avalanche Current (L= 10.0mH)		I_{AS}	10.5	A
Power Dissipation	T_C = 25°C	P_D	500	W
	T_C = 100°C		200.0	W
MOSFET dv/dt Ruggedness, V_{DS}=0…400V		dv/dt	70	V/ns
Reverse Diodes dv/dt, V_{DS}=0…400V, I_{SD}≤I_D		dv/dt	70	V/ns
Junction & Storage Temperature Range		T_J, T_{STG}	-55 ~ +150	°C

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient (4)	$R_{\theta JA}$	36	45	°C/W
Thermal Resistance, Junction-to-Case (5)	$R_{\theta JC}$	0.18	0.25	°C/W

Electrical Characteristics (@ T_J = 25°C, unless otherwise specified.)

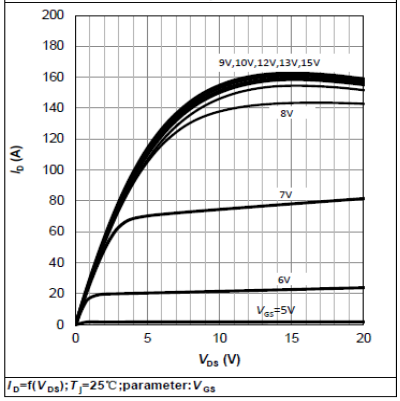
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics (6)						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	600	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 600V, V_{GS} = 0V	-	-	10.0	μA
		T_J = 125°C	-	1000	-	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V	-	-	±100	nA
On Characteristics (6)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = 250μA	3.0	4.0	5.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 58.2A	-	33.0	38	mΩ
Diodes Forward Voltage	V_{SD}	I_S = 10A, V_{GS} = 0V	-	0.90	1.1	V
Dynamic Characteristics (7)						
Input Capacitance	C_{iss}	V_{DS} = 400V, V_{GS} = 0V, f = 1MHz	-	4640	-	pF
Output Capacitance	C_{oss}		-	135	-	pF
Reverse Transfer Capacitance	C_{rss}		-	3.0	-	pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz	-	2.0	-	Ω
Switching Characteristics (7)						
Turn-On DelayTime	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 400V I_D = 17A, R_{GEN} = 27Ω	-	30	-	ns
Rise Time	t_r		-	30	-	ns
Turn-Off DelayTime	$t_{d(off)}$		-	75	-	ns
Fall Time	t_f		-	20	-	ns
Gate Charge Characteristics (7)						
Total Gate Charge (V_{GS} = 10V)	Q_g	V_{DS} = 480V, I_D = 10A V_{GS} = 10V	-	110	-	nC
Total Gate Charge (V_{GS} = 8.0V)	Q_g		-	83	-	nC
Gate-Source Charge	Q_{gs}		-	35	-	nC
Gate-Drain Charge	Q_{gd}		-	40	-	nC
Gate Plateau Voltage	$V_{plateau}$		-	6.0	-	V
Drain-Source Diode Characteristics (7)						
Body Diode Reverse Recovery Time	t_{rr}	I_F = 17A, dI/dt = 100A/μs, T_J = 25°C	-	120	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	0.6	-	μC
Diode Forward Current	I_S	T_C = 25°C	-	-	70	A

Notes:

1. This current is chip limited, which is calculated based on Rthjc.
2. This current is calculated on single pulse with 10μs Pulse & Duty Cycle = 1%.
3. Defined by design, not subject to production test, E_{AS} condition: T_J=25°C, V_{DD}=400V, V_{GS}=10V, L=50mH.
4. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
5. Thermal resistance from junction to the exposed pad.
6. Short duration pulse test used to minimize self-heating effect.
7. Defined by design, not subject to production.
8. $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 480V.
9. $C_{O(tr)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 480V.

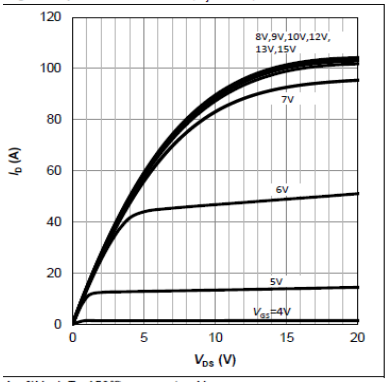
Typical Electrical and Thermal Characteristics

Fig 1. Output Characteristics (T_j=25℃)



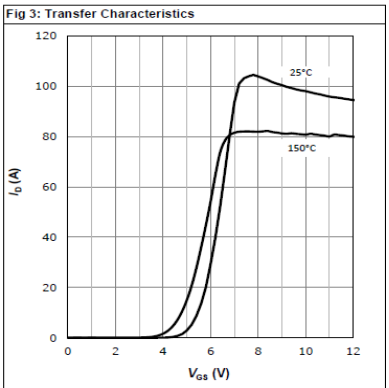
I_D=f(V_{DS});T_j=25℃;parameter:V_{GS}

Fig 2. Output Characteristics (T_j=150℃)



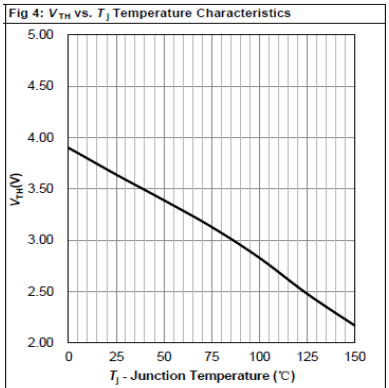
I_D=f(V_{DS});T_j=150℃;parameter:V_{GS}

Fig 3: Transfer Characteristics



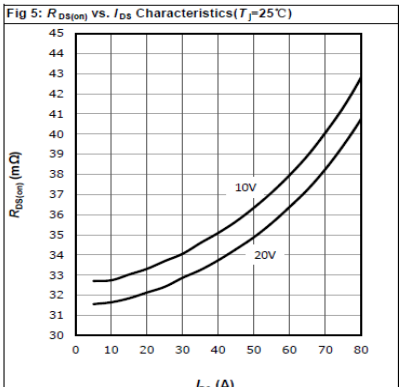
I_D=f(V_{GS});V_{DS}=15V;parameter:T_j

Fig 4: V_{TH} vs. T_j Temperature Characteristics



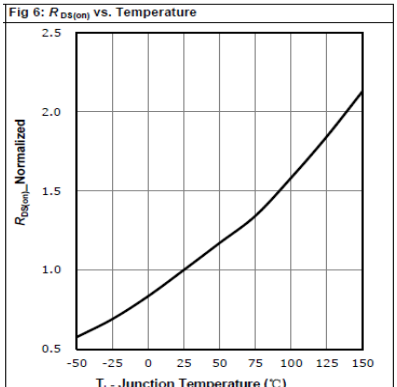
V_{TH}=f(T_j);I_D=2mA

Fig 5: $R_{DS(on)}$ vs. I_{DS} Characteristics(T_j=25℃)



$R_{DS(on)}$=f(I_D);T_j=25℃;parameter:V_{GS}

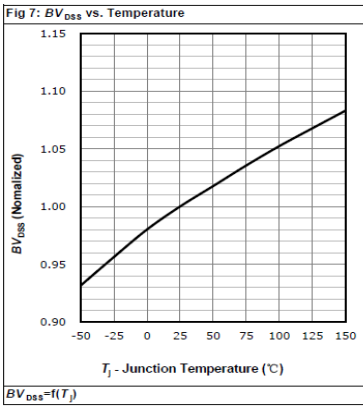
Fig 6: $R_{DS(on)}$ vs. Temperature



$R_{DS(on)}$=f(T_j);I_D=25A;V_{GS}=10V

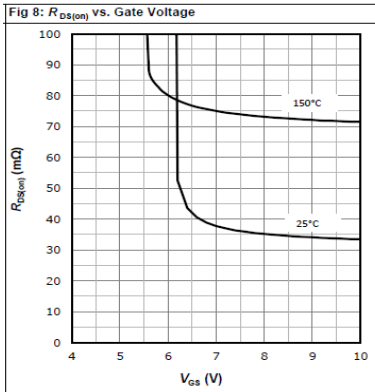
Typical Electrical and Thermal Characteristics

Fig 7: BV_{DSS} vs. Temperature



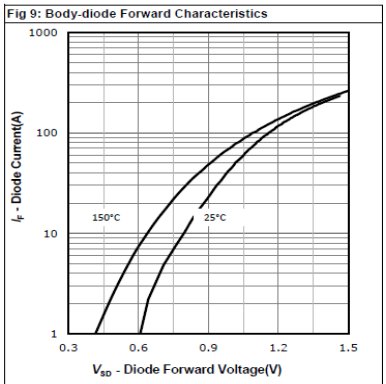
$BV_{DSS}=f(T_j)$

Fig 8: $R_{DS(on)}$ vs. Gate Voltage



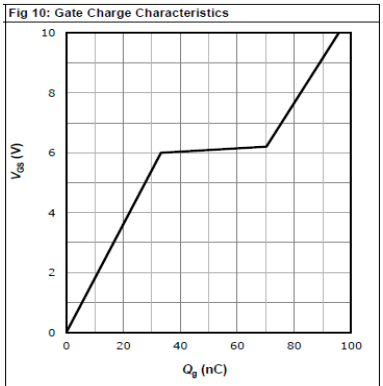
$R_{DS(on)}=f(V_{GS})$;I_D=25A;parameter:T_j

Fig 9: Body-diode Forward Characteristics



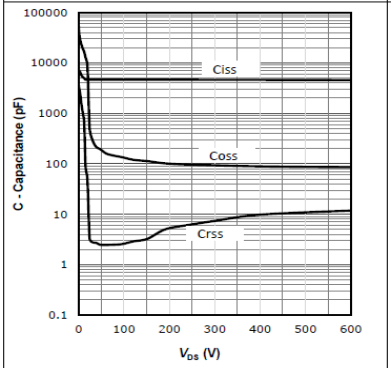
$I_F=f(V_{SD})$;parameter:T_j

Fig 10: Gate Charge Characteristics



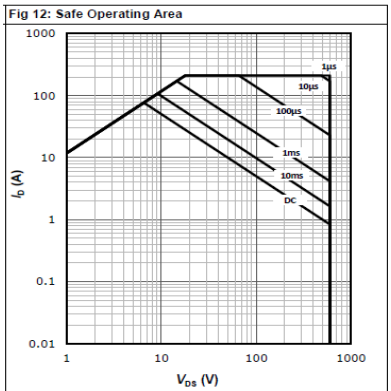
$V_{GS}=f(Q_g)$;V_{DD}=480V;I_D=25A

Fig 11: Capacitance Characteristics



$C=f(V_{DS})$;V_{GS}=0V;f=100kHZ

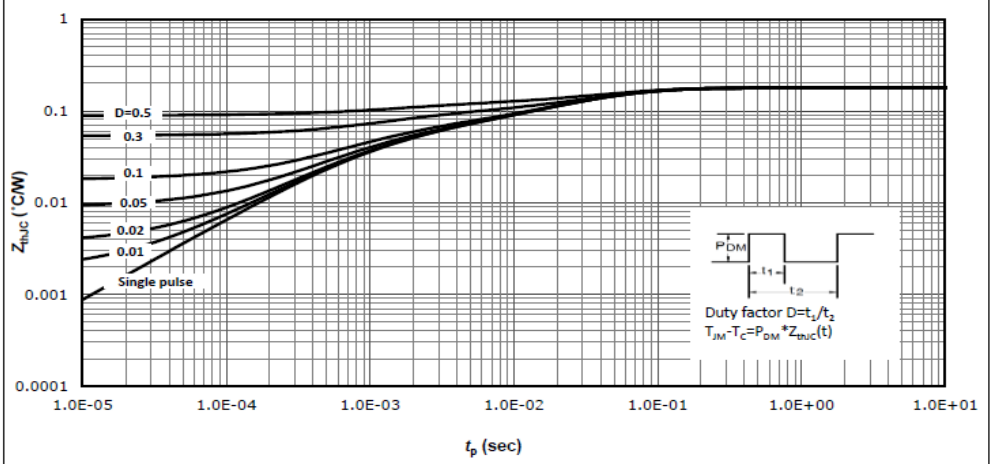
Fig 12: Safe Operating Area



$I_D=f(V_{DS})$;T_C=25°C;D=0;parameter:t_p

Typical Electrical and Thermal Characteristics

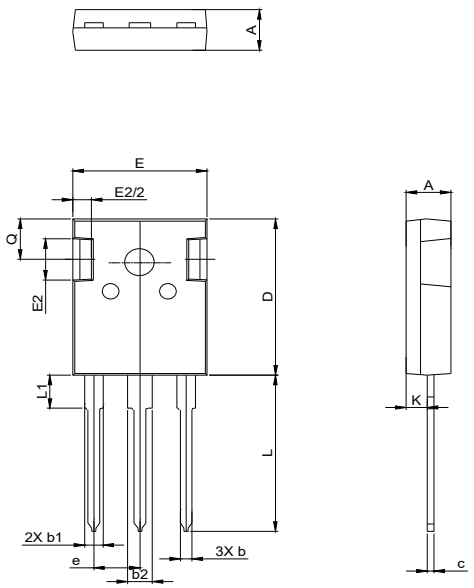
Fig 13: Max. Transient Thermal Impedance



$Z_{thJC}=f(t_p)$;parameter:D=t_1/t_2

TO247-3L Package Outline

Package Outline



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.80	5.00	5.20
b	1.00	1.20	1.40
b1	1.80	2.00	2.20
b2	2.80	3.00	3.20
c	0.50	0.60	0.70
D	20.80	21.00	21.20
E	15.50	15.80	16.10
E2	4.50	5.00	5.50
L	19.70	20.00	20.30
L1	4.00	4.20	4.40
K	2.30	2.40	2.50
e	5.44 BSC		