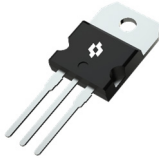


Product Summary

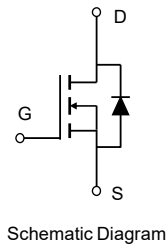
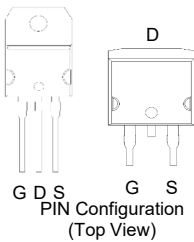
V_{DS}	$R_{DS(ON_MAX)}$	I_{D_MAX}
650 V	99 mΩ @ $V_{GS} = 10V$	31 A

TO220-3L-B


Top View

TO263-3L-B


Top View


Features

- Low On-Resistance
- Fast Switching Capability
- 100% ΔV_{DS} & UIS & Rg Tested


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)
SMJ65R099CFSS	TO220-3L-B	65R099CFS	Tube	50
SMJ65R099CFTS	TO263-3L-B	65R099CFS	13" Tape&Reel	800

Maximum Ratings (@ $T_C = 25^\circ\text{C}$, unless otherwise specified.)

Parameter	Symbol	Value	Unit
Drain - Source Voltage	V_{DS}	650	V
Gate - Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ($V_{GS} = 10V$) ⁽¹⁾	$T_C = 25^\circ\text{C}$	31	A
	$T_C = 100^\circ\text{C}$	20	A
Pulsed Drain Current ⁽²⁾	I_{DM}	93	A
Single Pulse Avalanche Energy ⁽³⁾	E_{AS}	480	mJ
Single Pulse Avalanche Current ($L = 10.0\text{mH}$)	I_{AS}	8.4	A
Power Dissipation	$T_C = 25^\circ\text{C}$	202	W
	$T_C = 100^\circ\text{C}$	81	W
MOSFET dv/dt Ruggedness, $V_{DS} = 0 \dots 400V$	dv/dt	50	V/ns
Reverse Diodes dv/dt, $V_{DS} = 0 \dots 400V$, $I_{SD} \leq I_D$	dv/dt	50	V/ns
Junction & Storage Temperature Range	T_J, T_{STG}	$-55 \sim +150$	$^\circ\text{C}$

Thermal Characteristics

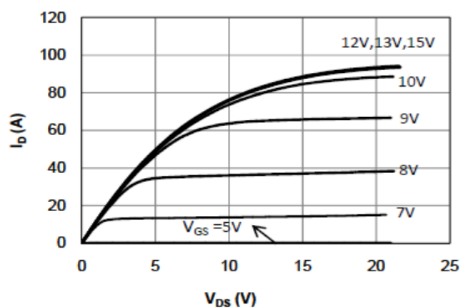
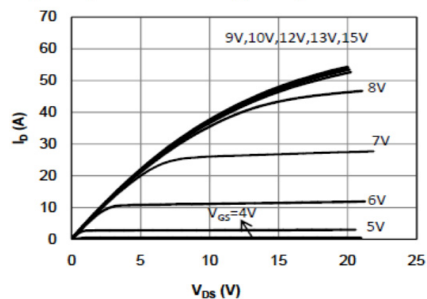
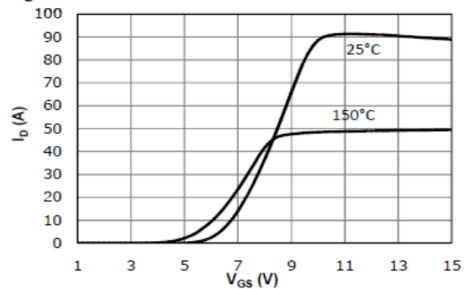
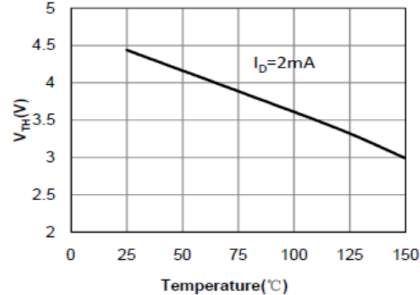
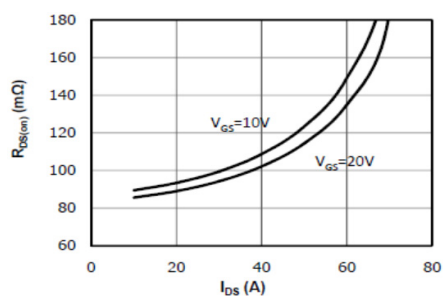
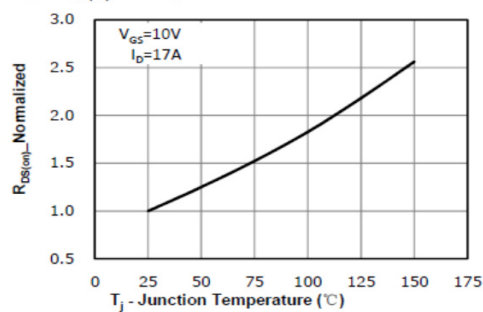
Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient ⁽⁴⁾	$R_{\theta JA}$	52	65	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case ⁽⁵⁾	$R_{\theta JC}$	0.48	0.62	$^\circ\text{C/W}$

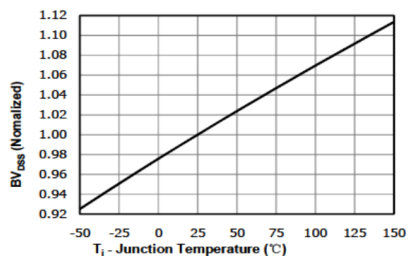
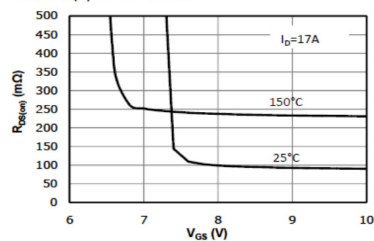
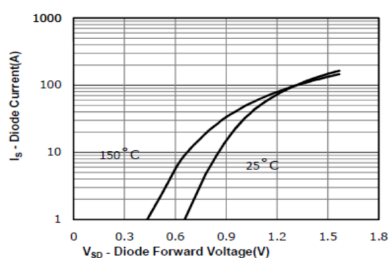
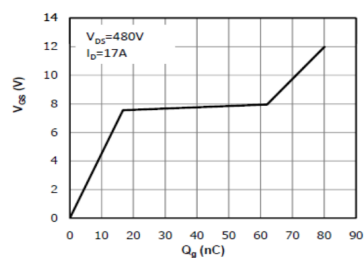
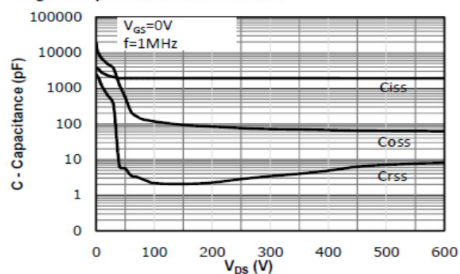
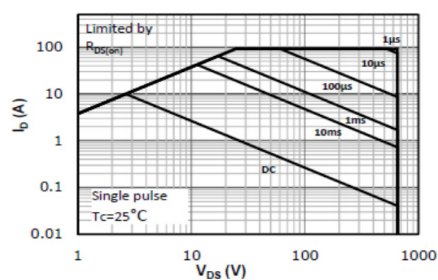
Electrical Characteristics (@ $T_J = 25^\circ\text{C}$, unless otherwise specified.)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics ⁽⁶⁾						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	650	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V	-	-	5.0	μA
		T _J = 125°C	-	800	-	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	3.2	3.8	4.6	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 10A	-	87	99	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	-	1900	-	pF
Output Capacitance	C _{oss}		-	117	-	pF
Reverse Transfer Capacitance	C _{rss}		-	2.2	-	pF
Gate Resistance	R _g	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz	-	0.9	-	Ω
Switching Characteristics ⁽⁷⁾						
Turn-On DelayTime	t _{d(on)}	V _{GS} = 10V, V _{DS} = 400V I _D = 17A, R _{GEN} = 27Ω	-	50	-	ns
Rise Time	t _r		-	100	-	ns
Turn-Off DelayTime	t _{d(off)}		-	180	-	ns
Fall Time	t _f		-	50	-	ns
Gate Charge Characteristics ⁽⁷⁾						
Total Gate Charge (V _{GS} = 10V)	Q _g	V _{DS} = 480V, I _D = 10A V _{GS} = 10V	-	70	-	nC
Total Gate Charge (V _{GS} = 8.0V)	Q _g		-	64	-	nC
Gate-Source Charge	Q _{gs}		-	17	-	nC
Gate-Drain Charge	Q _{gd}		-	45	-	nC
Gate Plateau Voltage	V _{plateau}		-	7.7	-	V
Drain-Source Diode Characteristics ⁽⁷⁾						
Body Diode Reverse Recovery Time	t _{rr}	I _F = 17A, dI/dt = 100A/μs,	-	140	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}	T _J = 25°C	-	0.89	-	μC
Diode Forward Current	I _S	T _C = 25°C	-	-	31	A

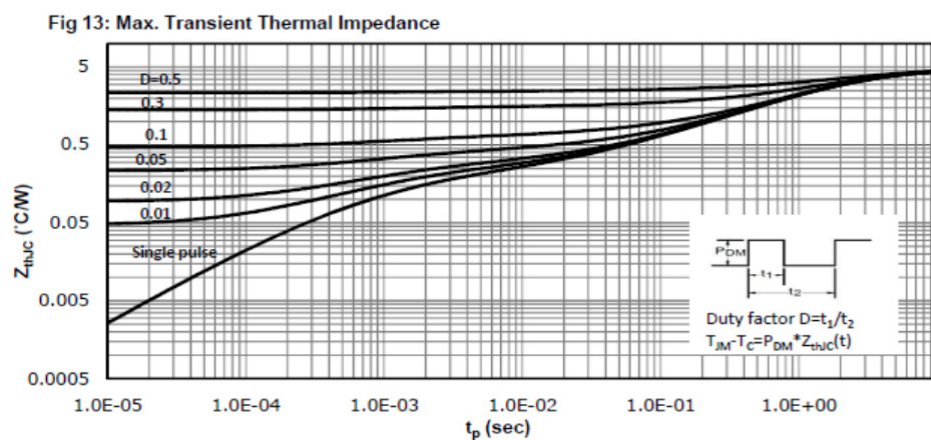
Notes:

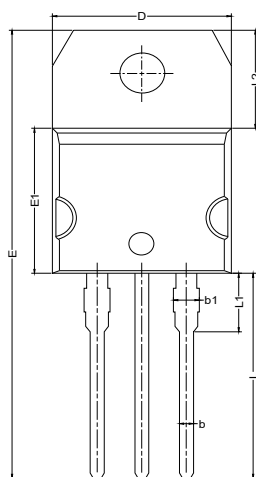
1. This current is chip limited, which is calculated based on R_{thjc} .
2. This current is calculated on single pulse with 10 μs Pulse & Duty Cycle = 1%.
3. Defined by design, not subject to production test, E_{AS} condition: $T_J = 25^\circ\text{C}$, $V_{DS} = 400V$, $V_{GS} = 10V$, $L = 50\text{mH}$.
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 ($T_J=25^\circ\text{C}$)

Fig 2: Output Characteristics ($T_J=150^\circ\text{C}$)

Fig 3: Transfer Characteristics

Fig 4: V_{th} Vs. T_J Temperature Characteristics

Fig 5: $R_{DS(on)}$ vs. I_{DS} Characteristics ($T_J=25^\circ\text{C}$)

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


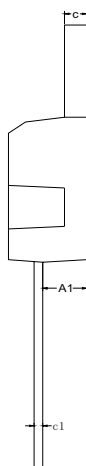
Typical Electrical and Thermal Characteristics
Fig 7: BV_{DSS} vs. Temperature

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

Fig 9: Body-diode Forward Characteristics

Fig 10: Gate Charge Characteristics

Fig 11: Capacitance Characteristics

Fig 12: Safe Operating Area


Typical Electrical and Thermal Characteristics

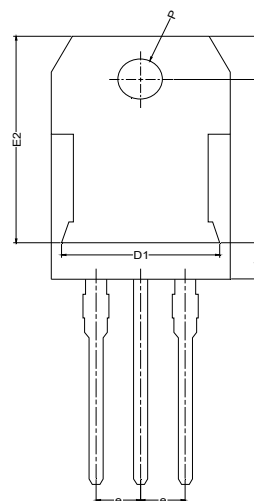


TO220-3L Package Outline
Package Outline


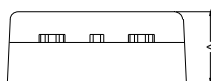
Top View



Side View



Bottom View

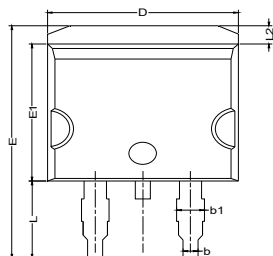


Front View

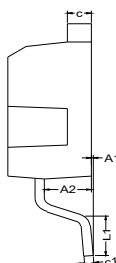
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMENSIONS IN MILLIMETER (ANGLE IN DEGREE).
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH.

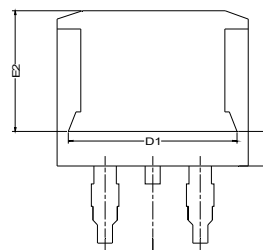
DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.250	4.450	4.650
A1	2.500 REF		
b	0.700	0.800	0.900
b1	1.270	1.470	1.670
c	1.170	1.270	1.370
c1	0.400	0.500	0.600
D	10.080	10.180	10.280
D1	9.000 REF		
E	27.500	--	28.700
E1	8.950	9.150	9.350
E2	13.040 REF		
L	12.730	12.930	13.130
L1	3.680 REF		
L2	5.990	6.190	6.390
k	2.070 REF		
e	2.540 BSC		

TO263-3L Package Outline
Package Outline


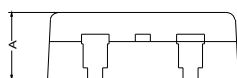
Top View



Side View



Bottom View



Front View

NOTES:

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DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
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A1	0.100 REF		
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b	0.700	0.800	0.900
b1	1.270	1.470	1.670
c	1.170	1.270	1.370
c1	0.400	0.500	0.600
D	10.080	10.180	10.280
D1	9.000 REF		
E	15.000	15.500	16.000
E1	8.950	9.150	9.350
E2	8.060 REF		
L	4.950	5.150	5.350
L1	2.600 REF		
L2	1.050	1.200	1.350
k	2.300 REF		
e	2.540 BSC		

Recommended Soldering Footprint :
