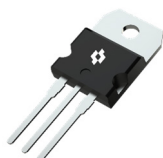
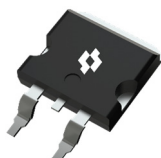


Product Summary

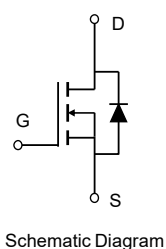
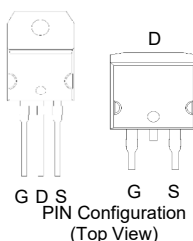
V_{DS}	$R_{DS(ON_MAX)}$	I_{D_MAX}
650 V	190 mΩ @ $V_{GS} = 10V$	19 A

TO220-3L-B


Top View

TO263-3L-B


Top View


Features

- Low On-Resistance
- Fast Switching Capability
- 100% ΔVDS & 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)
SMJ65R190CFS	TO220-3L-B	65R190CF	Tube	50
SMJ65R190CFT	TO263-3L-B	65R190CF	13" Tape&Reel	800

Maximum Ratings (@ $T_C = 25^{\circ}C$, 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⁾	$T_C = 25^{\circ}C$	19	A
	$T_C = 100^{\circ}C$	12	A
Pulsed Drain Current ⁽²⁾	I_{DM}	78	A
Single Pulse Avalanche Energy ⁽³⁾	E_{AS}	210	mJ
Single Pulse Avalanche Current ($L = 10.0mH$)	I_{AS}	7.7	A
Power Dissipation	$T_C = 25^{\circ}C$	169	W
	$T_C = 100^{\circ}C$	67.6	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 ~ +150	$^{\circ}C$

Thermal Characteristics

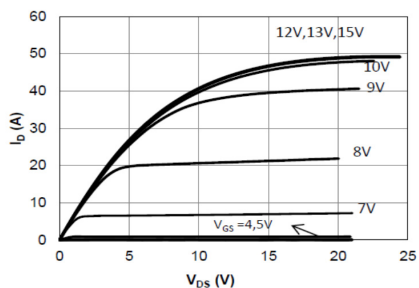
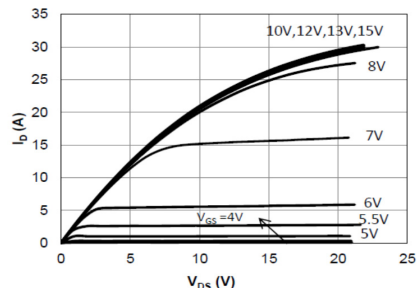
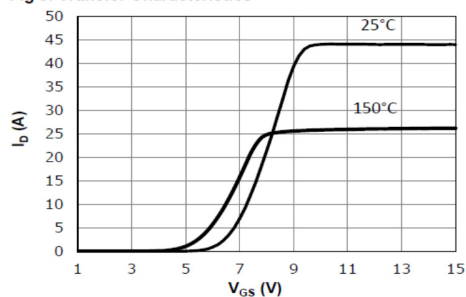
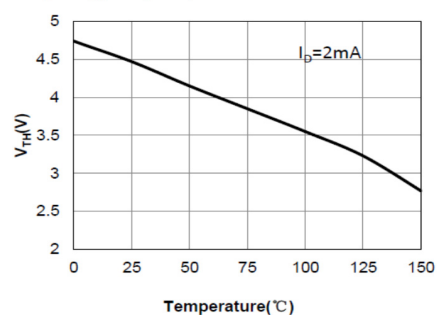
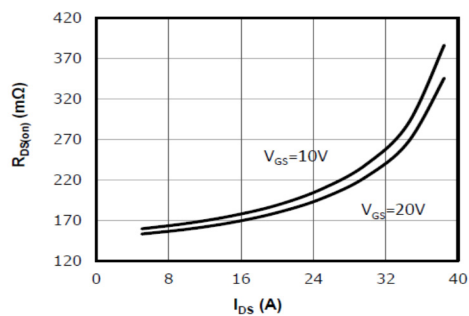
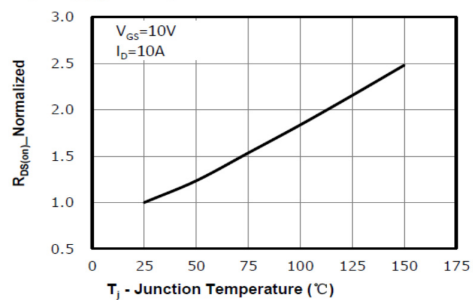
Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient ⁽⁴⁾	$R_{\theta JA}$	52	65	$^{\circ}C/W$
Thermal Resistance, Junction-to-Case ⁽⁵⁾	$R_{\theta JC}$	0.53	0.74	$^{\circ}C/W$

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	-	500	-	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	-	152	190	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	-	1110	-	pF
Output Capacitance	C _{oss}		-	65	-	pF
Reverse Transfer Capacitance	C _{rss}		-	0.8	-	pF
Gate Resistance	R _g	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz	-	13.0	-	Ω
Switching Characteristics ⁽⁷⁾						
Turn-On DelayTime	t _{d(on)}	V _{GS} = 10V, V _{DS} = 400V I _D = 17A, R _{GEN} = 27Ω	-	46	-	ns
Rise Time	t _r		-	61	-	ns
Turn-Off DelayTime	t _{d(off)}		-	120	-	ns
Fall Time	t _f		-	34	-	ns
Gate Charge Characteristics ⁽⁷⁾						
Total Gate Charge (V _{GS} = 10V)	Q _g	V _{DS} = 480V, I _D = 10A V _{GS} = 10V	-	36	-	nC
Total Gate Charge (V _{GS} = 8.0V)	Q _g		-	32	-	nC
Gate-Source Charge	Q _{gs}		-	10	-	nC
Gate-Drain Charge	Q _{gd}		-	20	-	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, T _J = 25°C	-	95	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	0.3	-	μC
Diode Forward Current	I _S	T _C = 25°C	-	-	19	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: $T_J = 25^\circ\text{C}$, $V_{DS} = 400V$, $V_{GS} = 10V$, $L = 50mH$.
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 ($T_J=25^\circ\text{C}$)

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

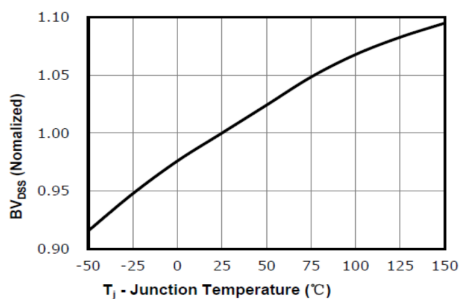


Fig 8: $R_{DS(on)}$ vs. Gate Voltage

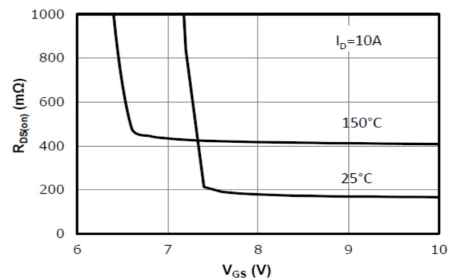


Fig 9: Body-diode Forward Characteristics

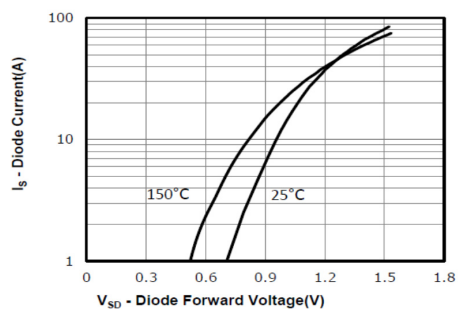


Fig 10: Gate Charge Characteristics

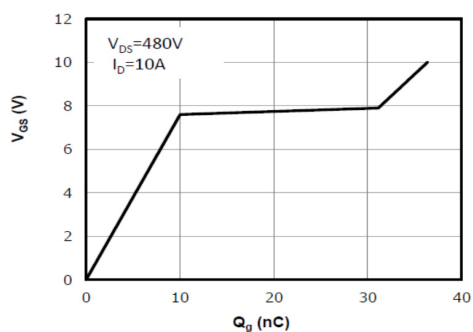


Fig 11: Capacitance Characteristics

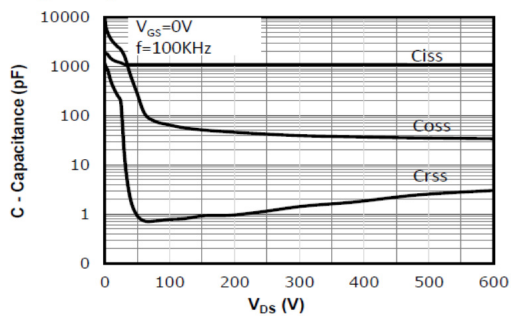
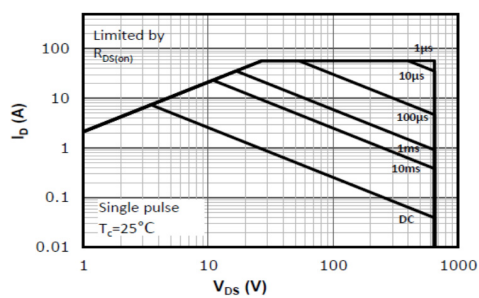
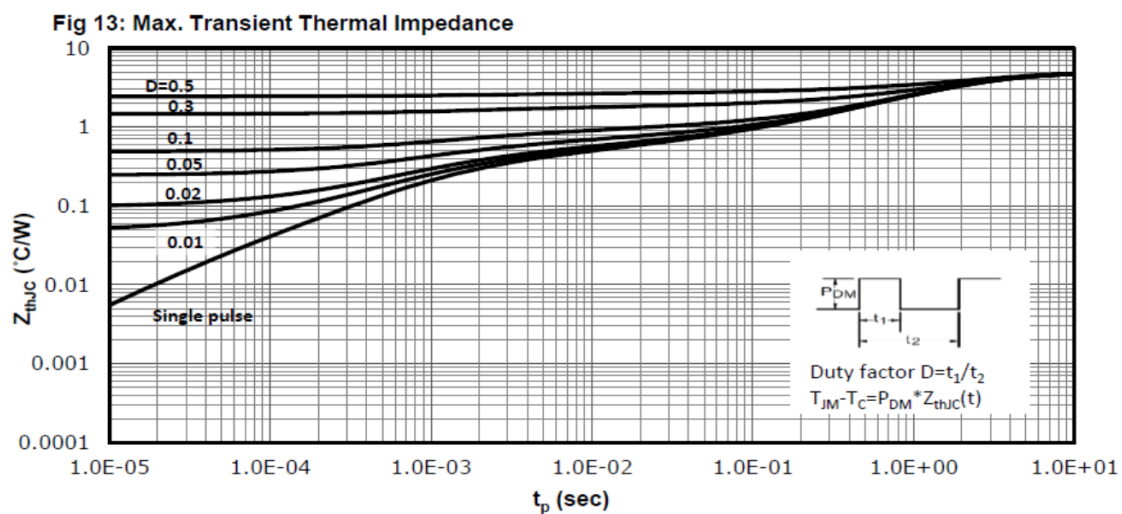
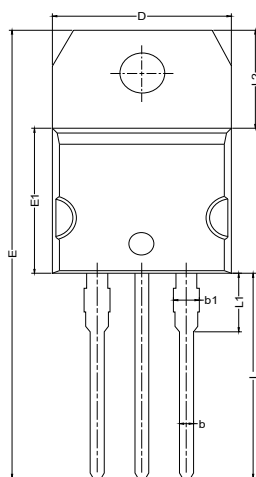


Fig 12: Safe Operating Area

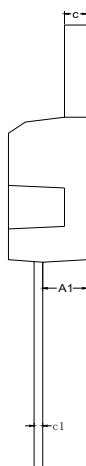


Typical Electrical and Thermal Characteristics

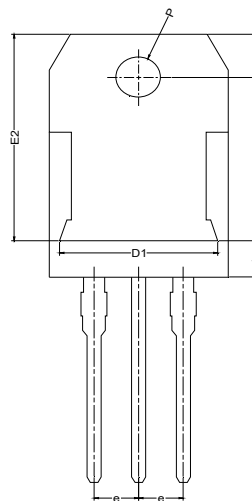


TO220-3L Package Outline
Package Outline


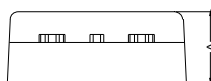
Top View



Side View



Bottom View

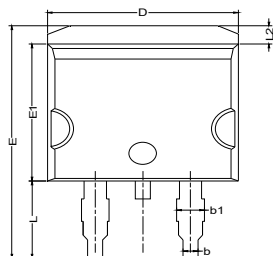


Front View

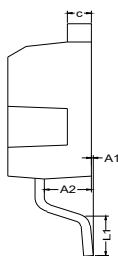
NOTES:

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.

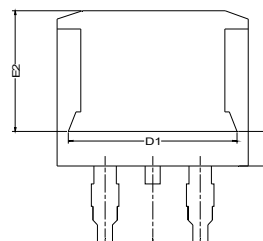
DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.250	4.450	4.650
A1	2.500 REF		
b	0.700	0.800	0.900
b1	1.270	1.470	1.670
c	1.170	1.270	1.370
c1	0.400	0.500	0.600
D	10.080	10.180	10.280
D1	9.000 REF		
E	27.500	--	28.700
E1	8.950	9.150	9.350
E2	13.040 REF		
L	12.730	12.930	13.130
L1	3.680 REF		
L2	5.990	6.190	6.390
k	2..070 REF		
e	2.540 BSC		

TO263-3L Package Outline
Package Outline


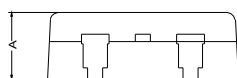
Top View



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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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 :
