

650V N-Channel Super Junction MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
650V	140mΩ@10V	25A

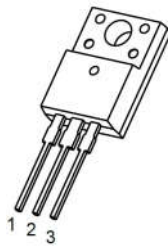
Features

- Super Junction MOSFET
- Fast Switching
- Easy to Drive/Use

Applications

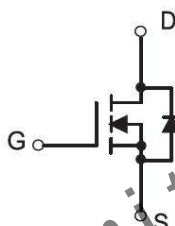
- SMPS
- Adapter
- LED lighting
- TV Power Supply

TO-220F



PIN1:GATE
PIN2:DRAIN
PIN3:SOURCE

Schematic diagram



Marking



J65R130AF : Device Code
YY : Year Code
WW : Week Code

Absolute Maximum rating ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain - Source Voltage	V_{DS}	650	V
Gate - Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D	25	A
Single pulsed avalanche ¹	E_{AS}	280	mJ
Power Dissipation	P_D	40	W
$T_C = 25^\circ\text{C}$			
Thermal Resistance from Junction to Case	$R_{\theta JC}$	3.1	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55~ +150	$^\circ\text{C}$

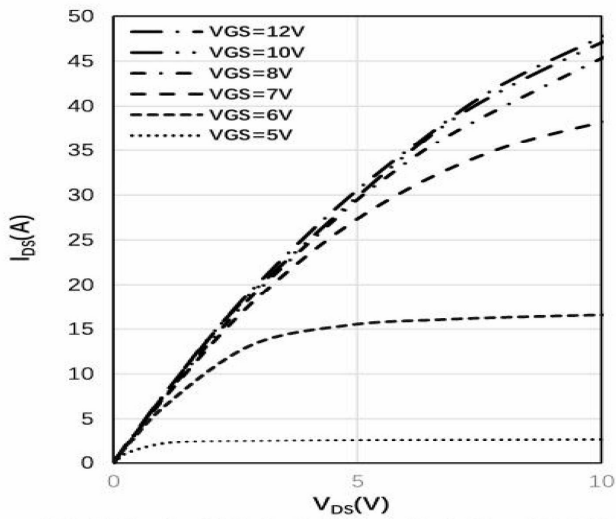
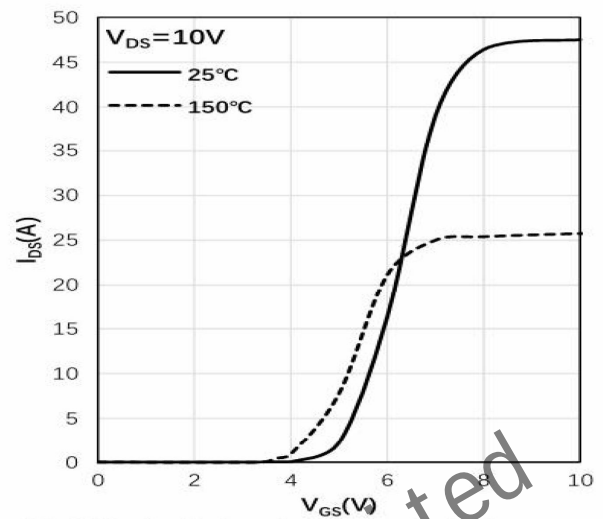
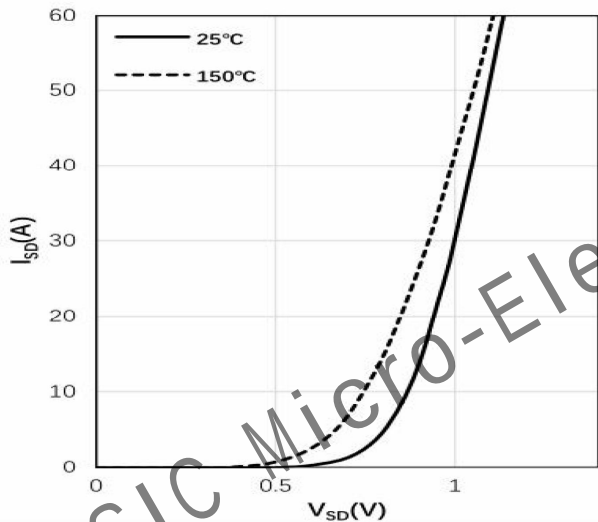
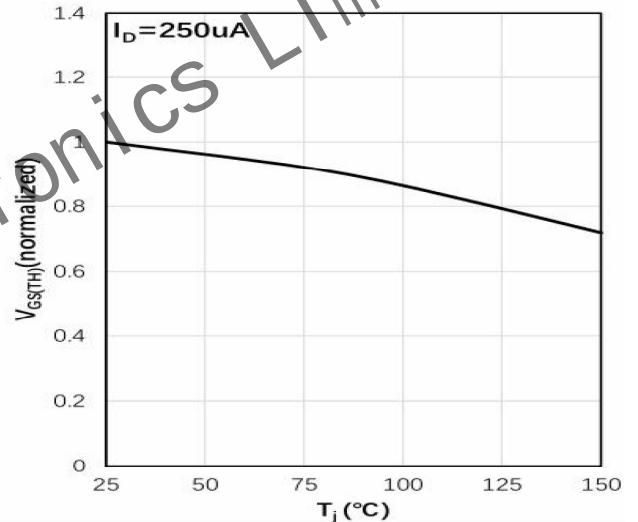
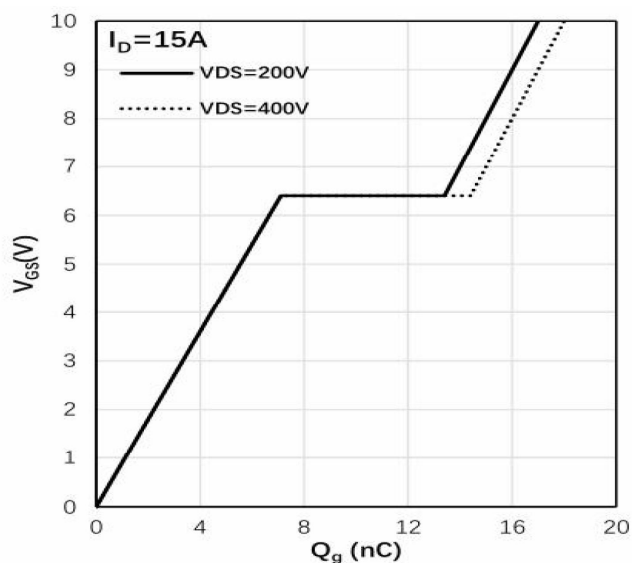
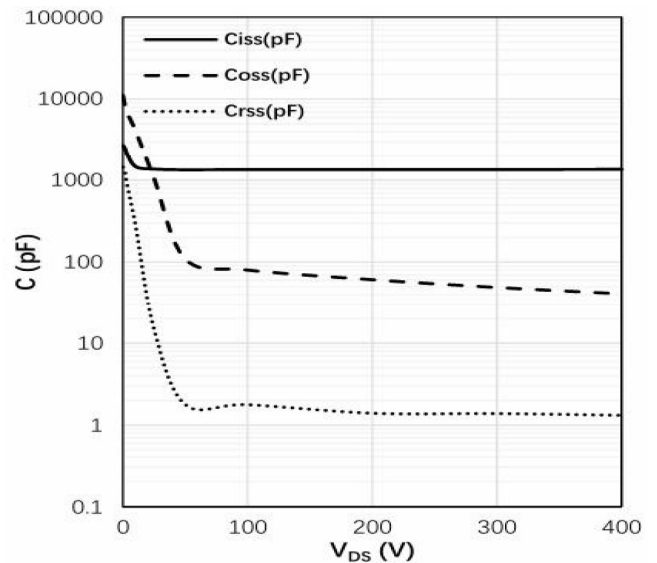
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain - Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$			1	μA
Gate - Body Leakage Current	I_{GSS}	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3	3.8	4.5	V
Drain-source On-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 6A$		140	170	m Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 50V, V_{GS} = 0V, f = 1MHz$		1350		pF
Output Capacitance	C_{oss}			110		
Reverse Transfer Capacitance	C_{rss}			2		
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 400V, V_{GS} = 10V, I_D = 15A$		18		nC
Gate-source Charge	Q_{gs}			7		
Gate-drain Charge	Q_{gd}			7		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 400V, I_D = 5A, V_{GS} = 10V,$ $R_G = 5\Omega$		43		ns
Turn-on Rise Time	t_r			21		
Turn-off Delay Time	$t_{d(off)}$			53		
Turn-off Fall Time	t_f			16		
Source - Drain Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 15A$			1.2	V
Reverse Recovery Time	t_{rr}	$V_{DD} = 400V, I_S = 15A,$		120		ns
Reverse Recovery Charge	Q_{rr}	$dI_F/dt = 100A/\mu s$		1.6		μC

Note:

- Starting $T_J = 25^\circ\text{C}$, $V_{DD} = 100V$, $V_{GS} = 10V$, $R_G = 25\Omega$, $L = 10mH$

Typical Characteristic


Fig.1 Typical Output Characteristics (25°C)

Fig.2 Typical Transfer Characteristics

Fig.3 Typical Diode V_{SD} vs. I_{SD} Characteristic

Fig.4 Threshold Voltage vs Temperature Characteristic

Fig.5 Gate Charge Characteristics

Fig.6 Typical Capacitance

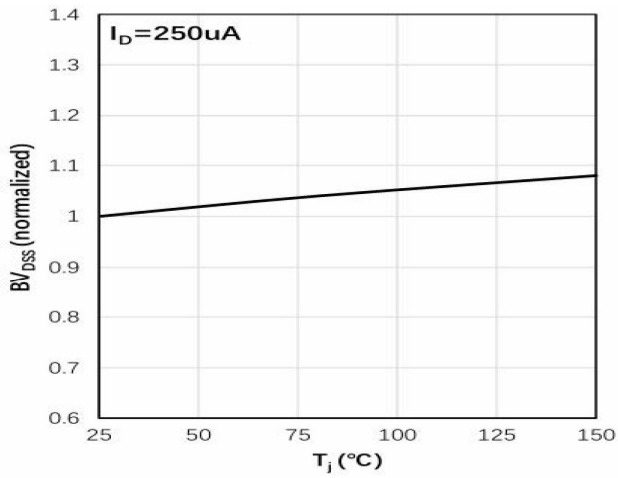


Fig.7 Breakdown Voltage vs. Temperature Characteristic

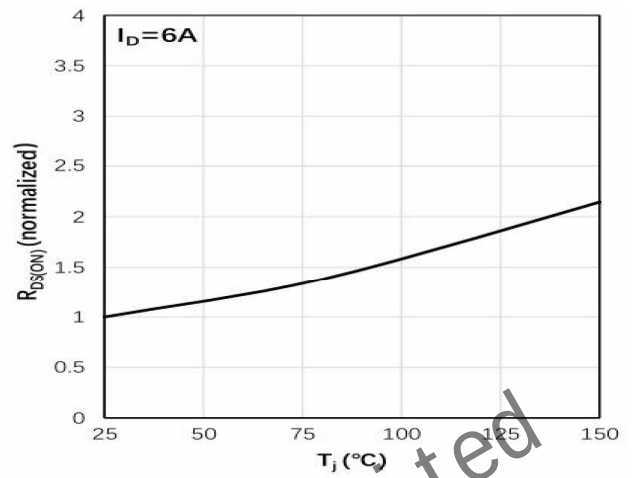


Fig.8 On Resistance vs. Temperature Characteristic

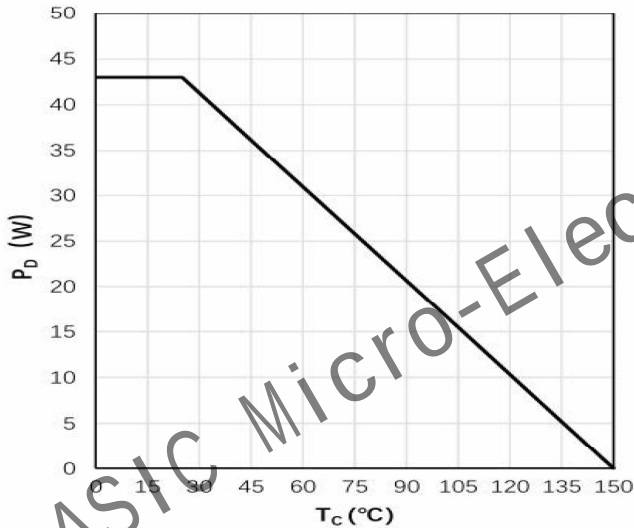


Fig.9 Power Dissipation Characteristic

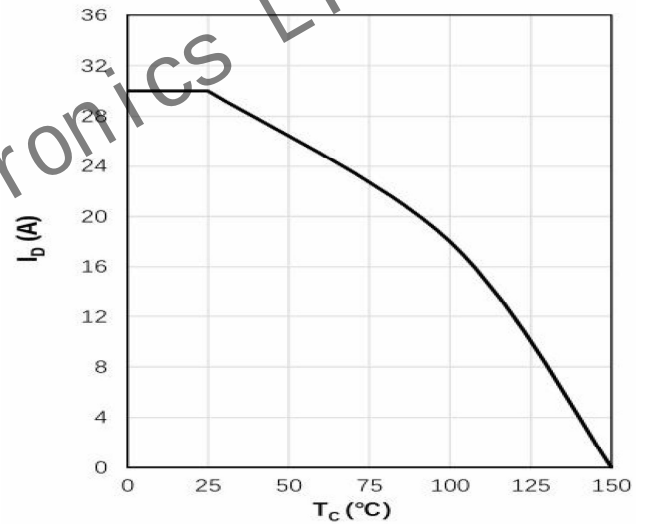


Fig.10 Drain Current vs. Temperature Characteristic

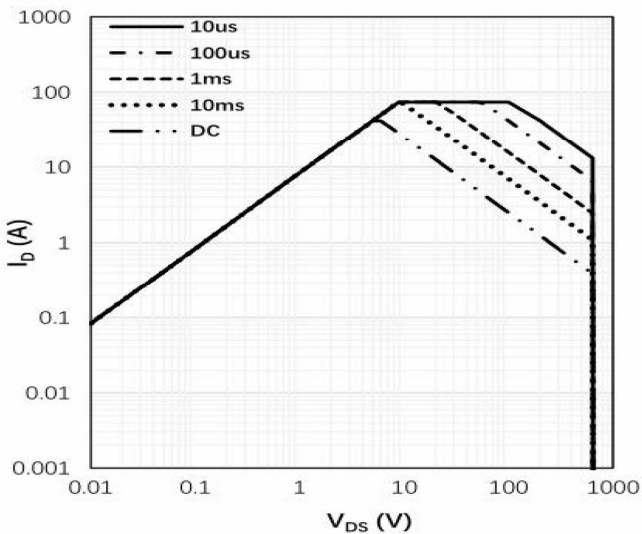


Fig.11 Safe Operating Area

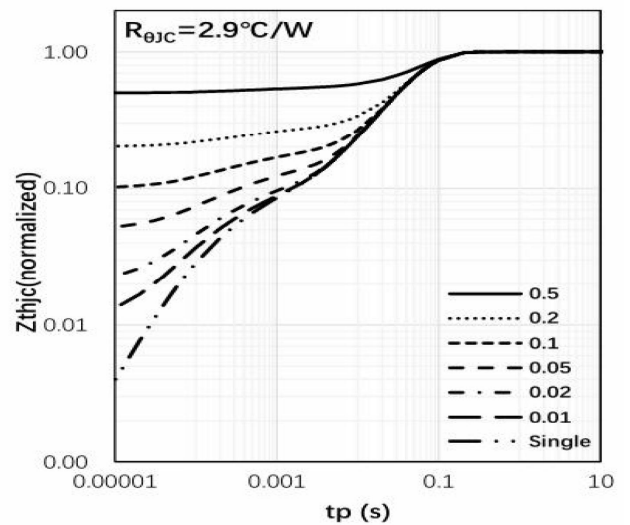
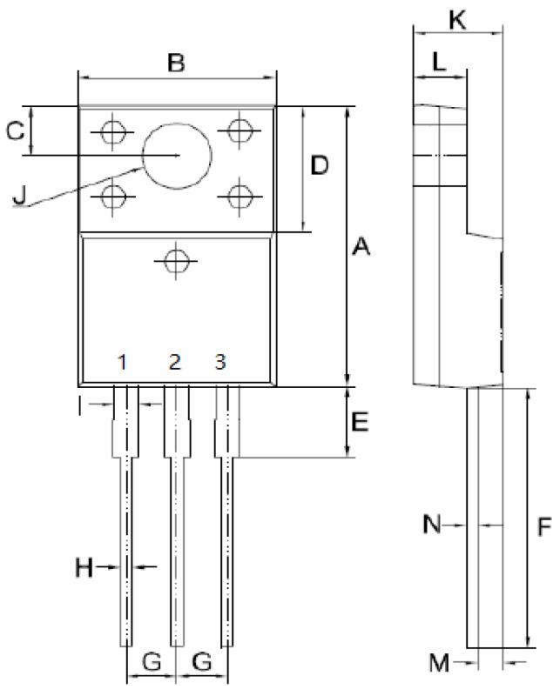


Fig.12 Transient Thermal Impedance

Dimension

TO-220F



Symbol	Millimeters	
	Min.	Max.
A	15.37	16.37
B	9.66	10.66
C	2.50	2.90
D	6.20	7.20
E	3.30	4.30
F	12.00	14.00
G	2.35	2.75
H	0.51	0.90
I	0.90	1.50
J	3.20	3.80
K	4.50	4.90
L	2.34	2.74
M	1.09	1.49
N	0.45	0.55