

650V N-Channel Super Junction MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
650V	320mΩ@10V	13A

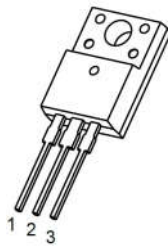
Features

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

Applications

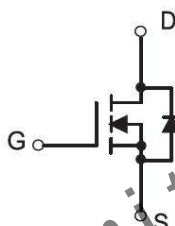
- SMPS
- DC/DC Converter
- Charger/Power Supply

TO-220F



PIN1:GATE
PIN2:DRAIN
PIN3:SOURCE

Schematic diagram



Marking



J65R320A : 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	13	A
Single pulsed avalanche ¹	E_{AS}	88	mJ
Power Dissipation	P_D	38	W
$T_C = 25^\circ\text{C}$			
Thermal Resistance from Junction to Case	$R_{\theta JC}$	3.3	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55~ +150	$^\circ\text{C}$

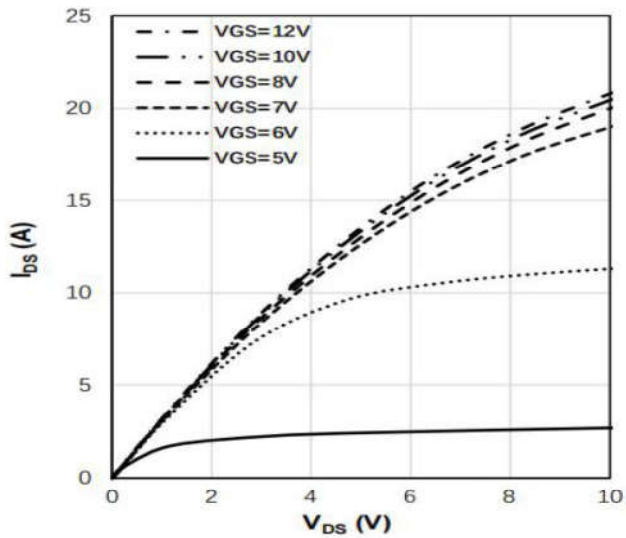
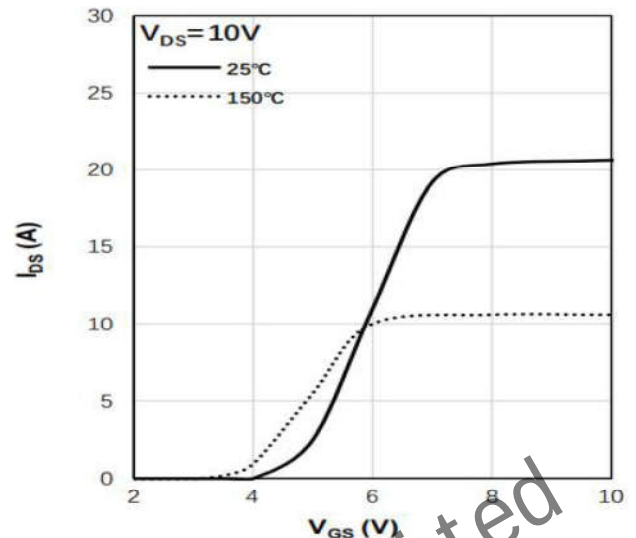
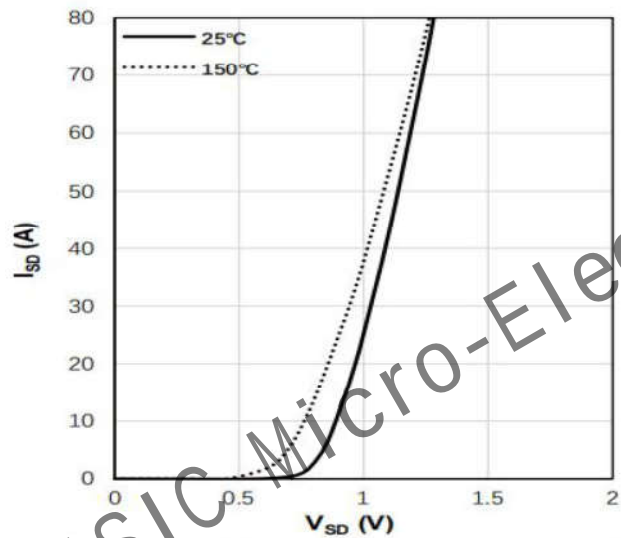
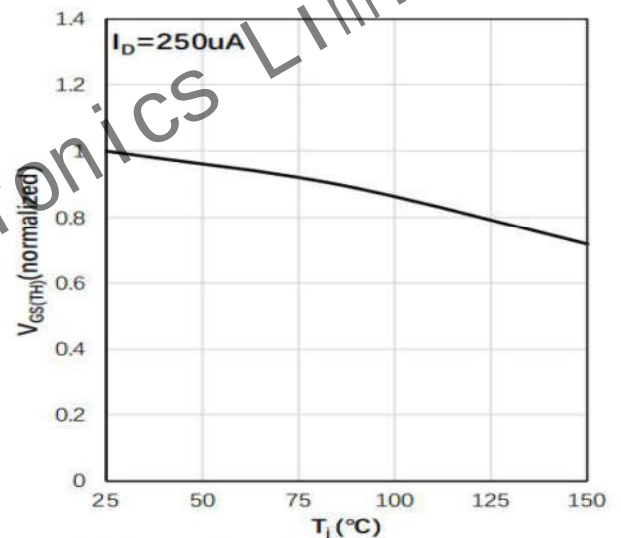
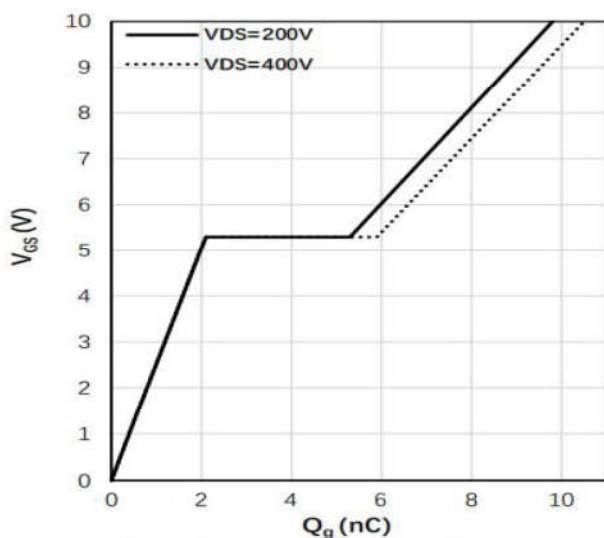
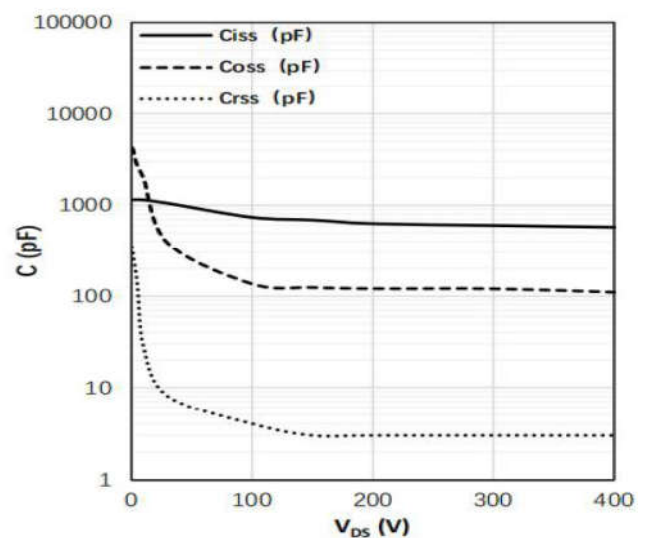
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

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	3.5	4	V
Drain-source On-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 7A$		320	380	m Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 50V, V_{GS} = 0V, f = 1MHz$		950		pF
Output Capacitance	C_{oss}			240		
Reverse Transfer Capacitance	C_{rss}			5.5		
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 400V, V_{GS} = 10V, I_D = 5A$		10.5		nC
Gate-source Charge	Q_{gs}			2.2		
Gate-drain Charge	Q_{gd}			3.8		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 400V, I_D = 5A, V_{GS} = 15V,$ $R_G = 10\Omega$		35		ns
Turn-on Rise Time	t_r			5		
Turn-off Delay Time	$t_{d(off)}$			47		
Turn-off Fall Time	t_f			3.5		
Source - Drain Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 1A$			1.3	V
Reverse Recovery Time	t_{rr}	$V_{DD} = 400V, I_S = 7A,$		215		ns
Reverse Recovery Charge	Q_{rr}	$dI_F/dt = 100A/\mu s$		2		μC

Note:

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

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

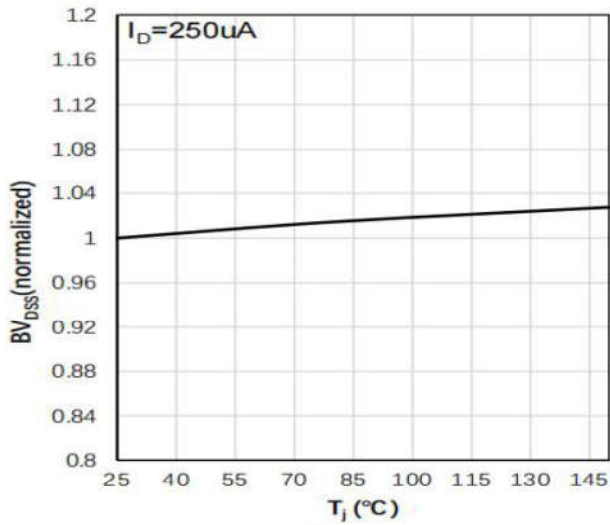


Fig.7 Breakdown Voltage vs. Temperature Characteristic

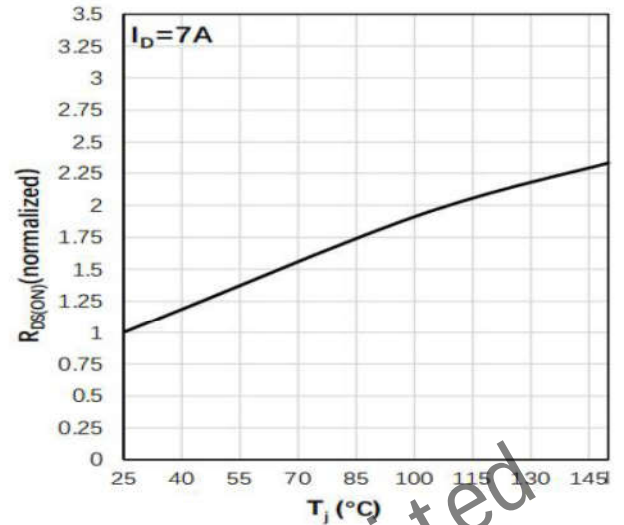


Fig.8 On Resistance vs. Temperature Characteristic

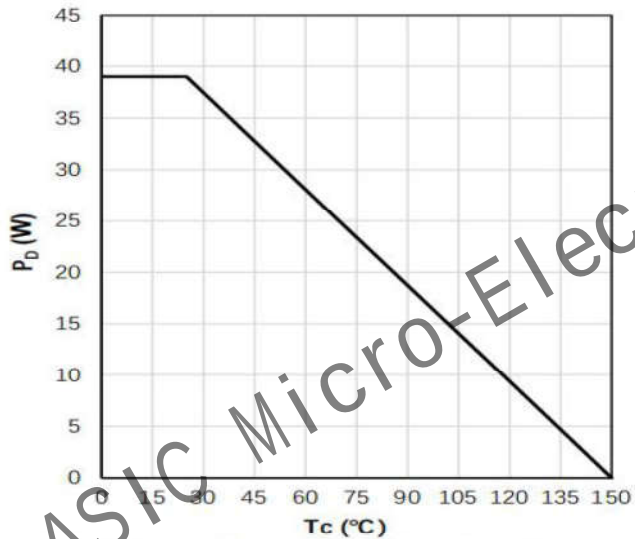


Fig.9 Power Dissipation Characteristic

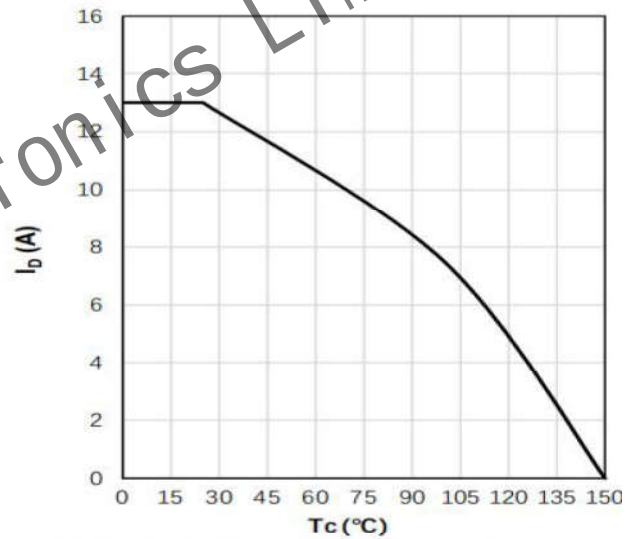


Fig.10 Drain Current vs. Temperature Characteristic

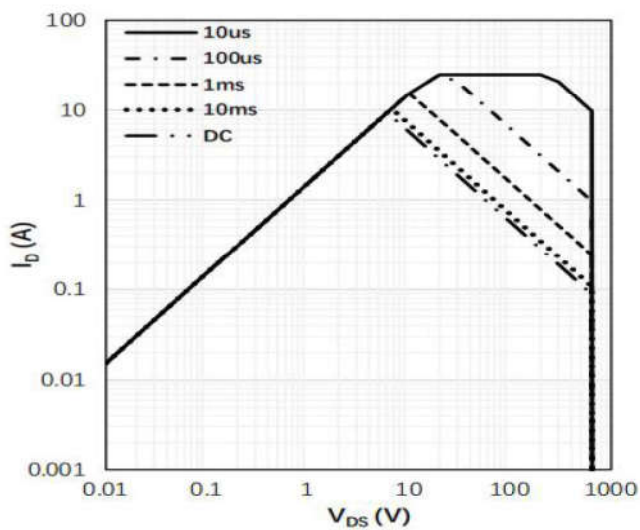


Fig.11 Safe Operating Area

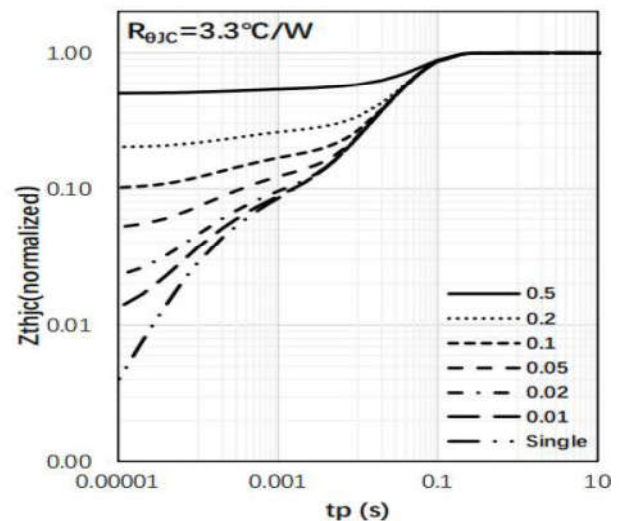
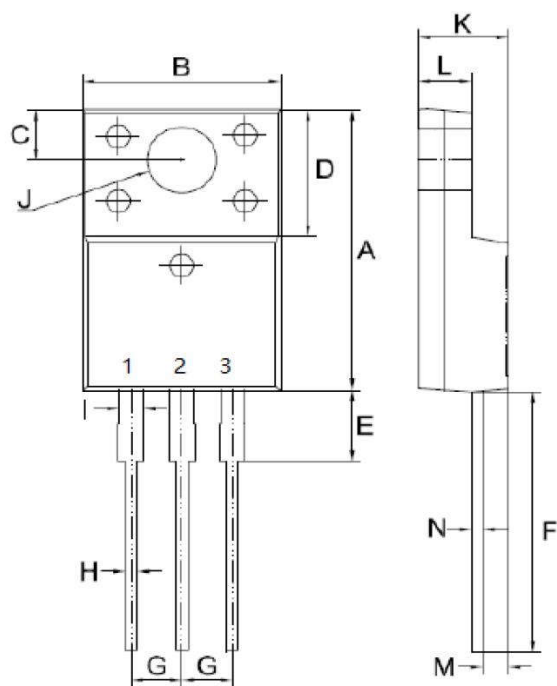


Fig.12 Transient Thermal Impedance

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