

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
650V	0.55Ω@10V	15A

## Feature

- Fast Switching
- Low Gate Charge and Rdson
- 100% Single Pulse avalanche energy Test

## Applications

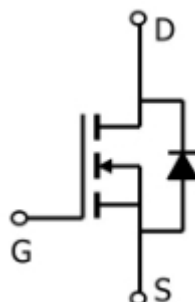
- DC-DC Converter
- Ideal for high-frequency switching and synchronous rectification

## Package

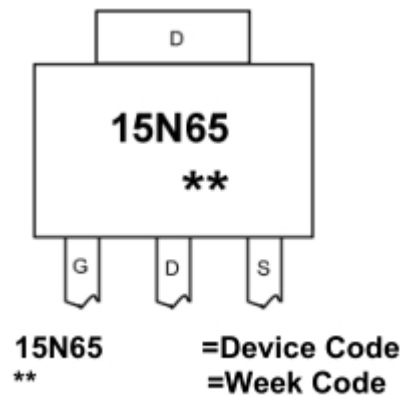


TO-220F(G:1 D:2 S:3)

## Circuit diagram



## Marking



## Absolute maximum ratings

(T<sub>a</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	650	V
Gate-Source Voltage	V <sub>GS</sub>	±30	V
Continuous Drain Current <sup>1</sup> (TC=25°C)	I <sub>D</sub>	15	W
Pulsed Drain Current	I <sub>DM</sub>	60	A
Single Pulse Avalanche Energy <sup>3</sup>	E <sub>AS</sub>	640	mJ
Total Power Dissipation(TC=25°C)	P <sub>D</sub>	43	W
Thermal Resistance Junction- Case	R <sub>θJC</sub>	2.9	°C/ W
Storage Temperature Range	T <sub>STG</sub>	-55~ +150	°C
Operating Junction Temperature Range	T <sub>J</sub>	-55~ +150	°C

## Electrical characteristics

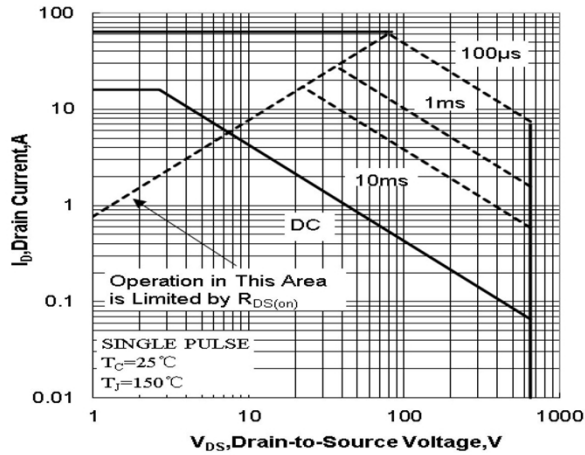
( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	650			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =520V,V <sub>GS</sub> = 0V , T <sub>J</sub> =25℃			1	uA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±30V , V <sub>DS</sub> =0V			±0.1	uA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	3	4	5	V
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =7A		0.55	0.7	Ω
Dynamic characteristics <sup>4</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz		2433		pF
Output Capacitance	C <sub>oss</sub>			217		
Reverse Transfer Capacitance	C <sub>rss</sub>			10		
Switching Characteristics						
Total Gate Charge(4.5V)	Q <sub>g</sub>	V <sub>DS</sub> =520V, V <sub>GS</sub> =10V, I <sub>D</sub> =15A		50		nC
Gate-Source Charge	Q <sub>gS</sub>			11		
Gate-Drain Charge	Q <sub>gd</sub>			20		
Turn-On Delay Time	T <sub>d(on)</sub>	V <sub>DD</sub> =325V, V <sub>GS</sub> =10V, R <sub>G</sub> =10Ω, I <sub>D</sub> =16A		26		nS
Rise Time	T <sub>r</sub>			41		
Turn-Off Delay Time	T <sub>d(off)</sub>			65		
Fall Time	T <sub>f</sub>			42		

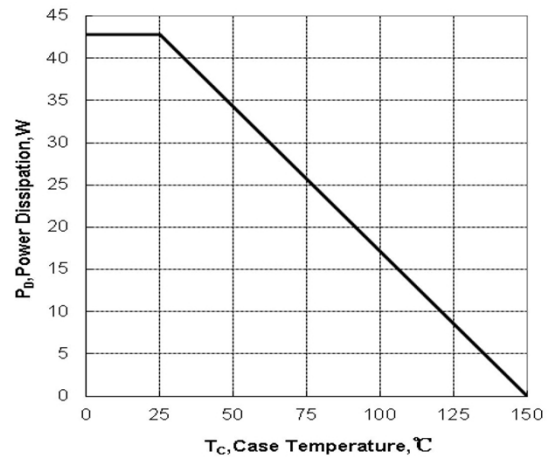
### Note :

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
3. The EAS data shows Max. rating . The test condition is  $R_G = 30\Omega, L = 10mH$

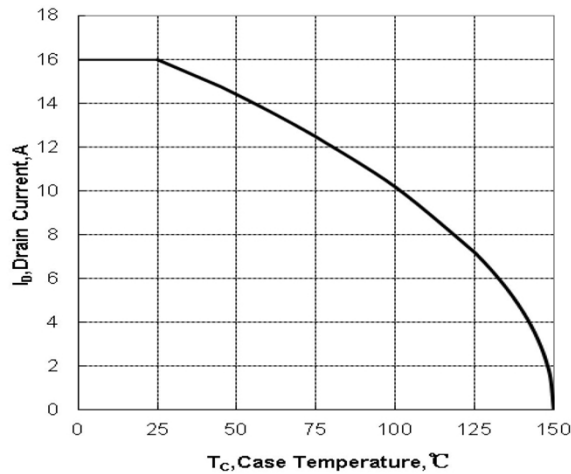
## Typical Characteristics



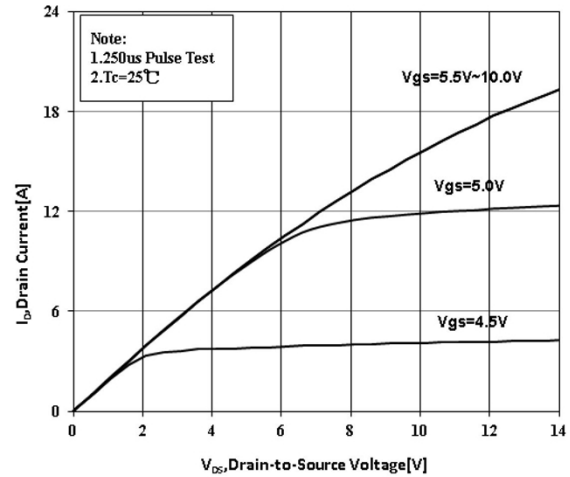
Maximum Forward Bias Safe Operating Area



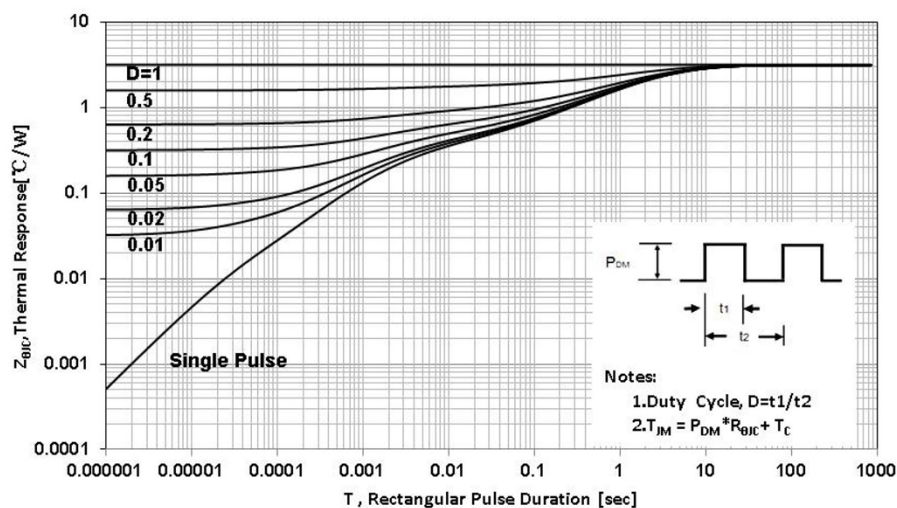
Maximum Power dissipation vs Case Temperature



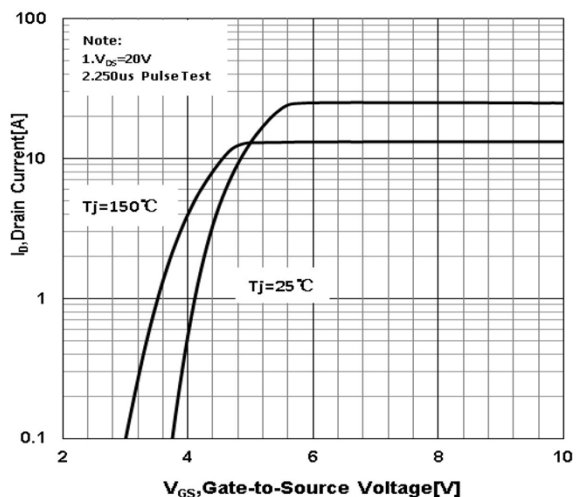
Maximum Continuous Drain Current vs Case Temperature



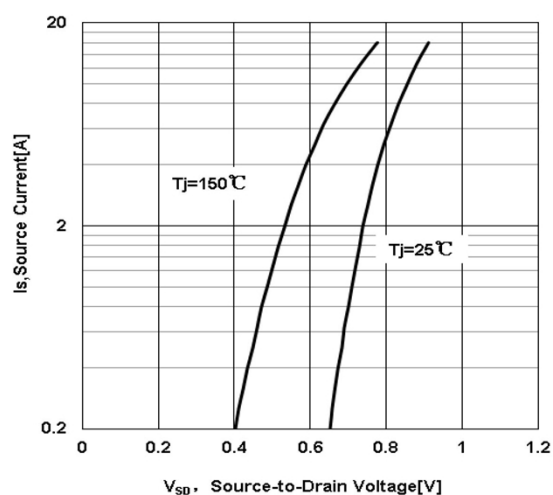
Typical Output Characteristics



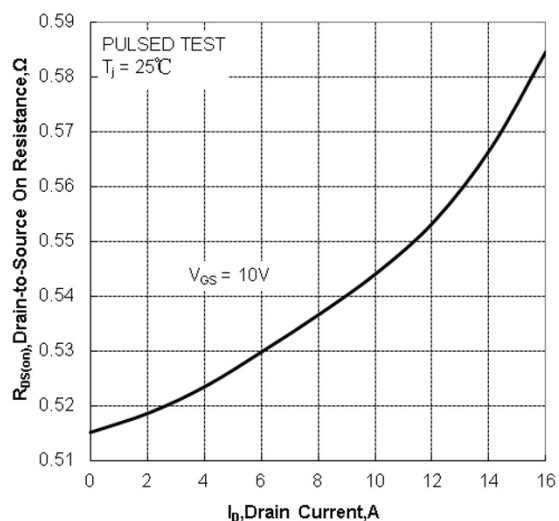
Maximum Effective Thermal Impedance, Junction to Case



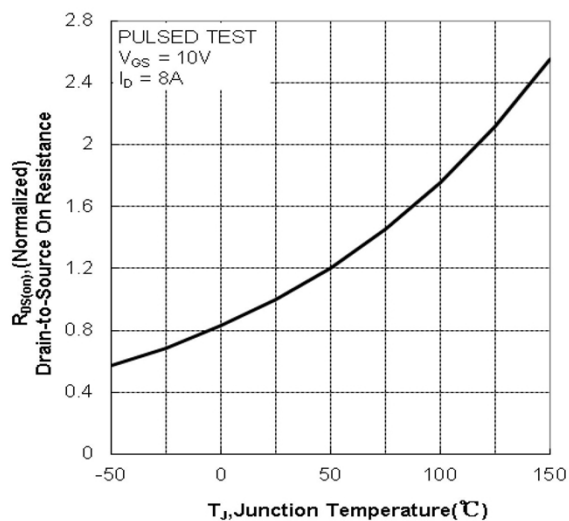
Typical Transfer Characteristics



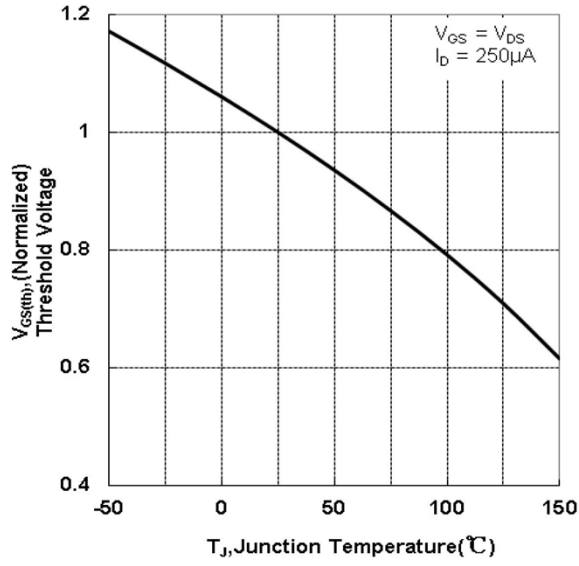
Typical Body Diode Transfer Characteristics



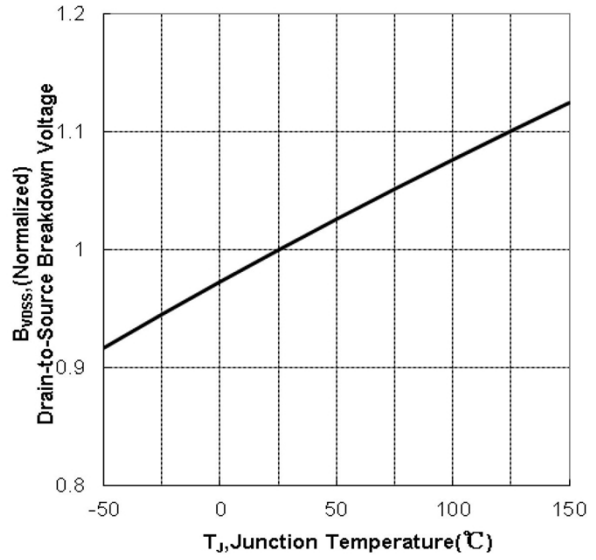
Typical Drain to Source ON Resistance  
vs Drain Current



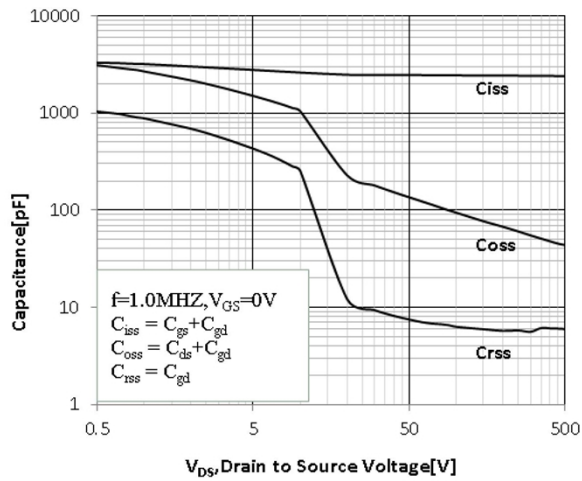
Typical Drain to Source on Resistance  
vs Junction Temperature



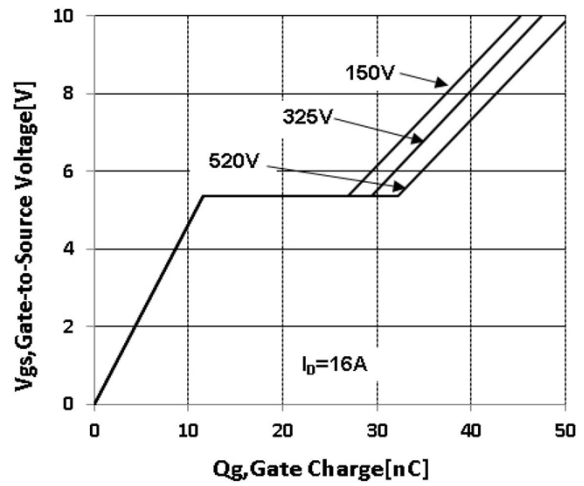
Typical Theshold Voltage vs Junction Temperature



Typical Breakdown Voltage vs Junction Temperature

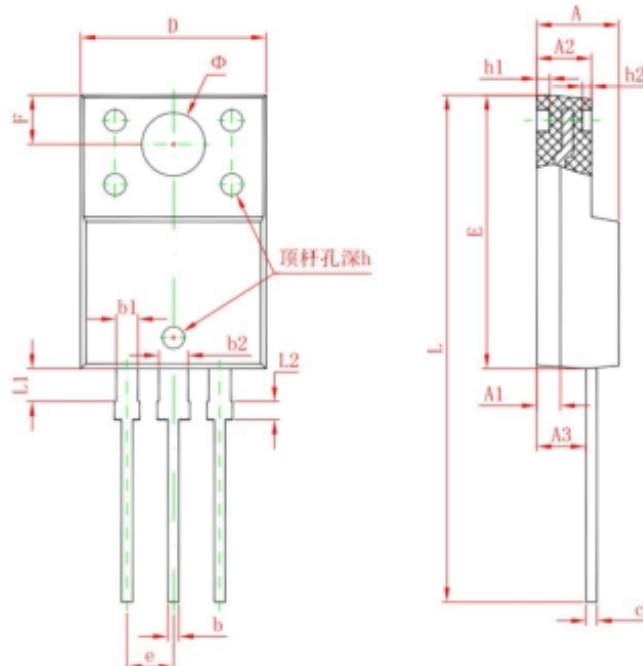


Typical Capacitance vs Drain to Source Voltage



Typical Gate Charge vs Gate to Source Voltage

## TO-220F Package Information



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.300	4.700
A1	1.300 REF.	
A2	2.800	3.200
A3	2.500	2.900
b	0.500	0.750
b1	1.100	1.350
b2	1.500	1.750
c	0.500	0.750
D	9.960	10.360
E	14.800	15.200
e	2.540 TYP.	
F	2.700 REF.	
$\Phi$	3.500 REF.	
h	0.000	0.300
h1	0.800 REF.	
h2	0.500 REF.	
L	28.000	28.400
L1	1.700	1.900
L2	0.900	1.100