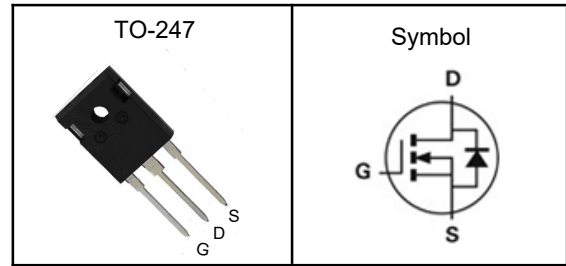


**650V Super Junction Power MOSFET**
**Features**

- Low drain-source on-resistance:  $R_{DS(ON)}=0.038\Omega(\text{typ})$
- Very Low FOM ( $R_{DS(on)} \times Q_g$ )
- Extremely low switching loss
- 100% avalanche tested
- RoHS compliant

**Applications**

- Switch Mode Power Supply (SMPS)
- TV power & LED Lighting Power
- AC to DC Converters
- Telecom

**Pin Description**


$V_{DSS}$	650	V
$R_{DS(ON)-Typ}$	38	m $\Omega$
$I_D$	60	A

**Absolute Maximum Ratings** ( $T_J=25^\circ\text{C}$ , Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit	
$V_{DSS}$	Drain-Source Voltage	650	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 30$	V	
$T_J$	Maximum Junction Temperature	-55 to 150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$E_{AS}$	Single Pulse Avalanche Energy	414	mJ	
$I_{DM}^{①}$	Pulse Drain Current Tested	236	A	
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$	60	A
	Continuous Drain Current	$T_C=100^\circ\text{C}$	40	A
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	347	W

**Thermal Characteristics**

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>①</sup>	46.2	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>①</sup>	0.36	$^\circ\text{C/W}$

Note ① : Max. current is limited by bonding wire.

Note ② : UIS tested and pulse width are limited by maximum junction temperature  $150^\circ\text{C}$ .

Note ③ : Surface Mounted on  $1\text{in}^2$  FR-4 board with 1oz.



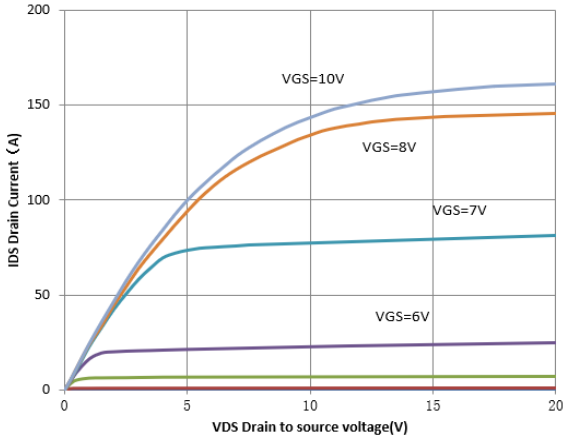
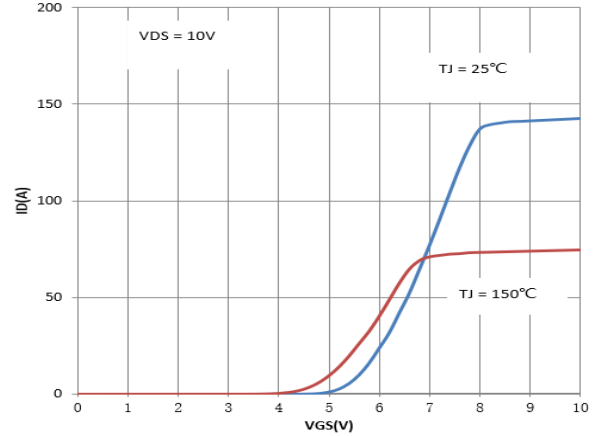
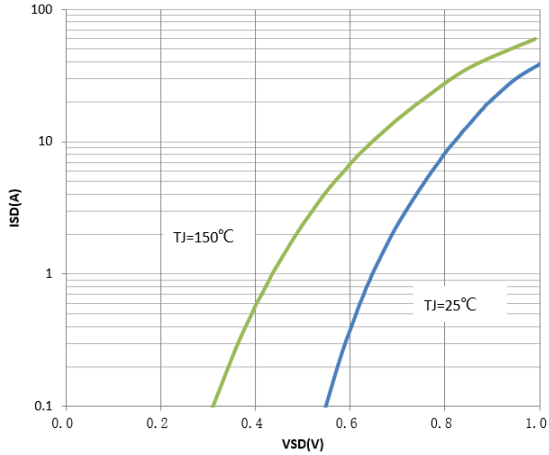
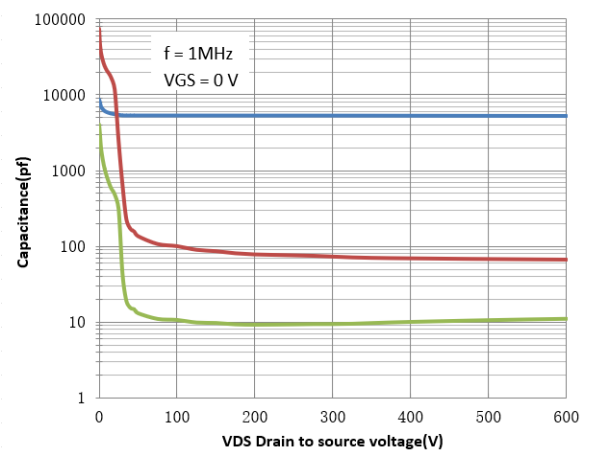
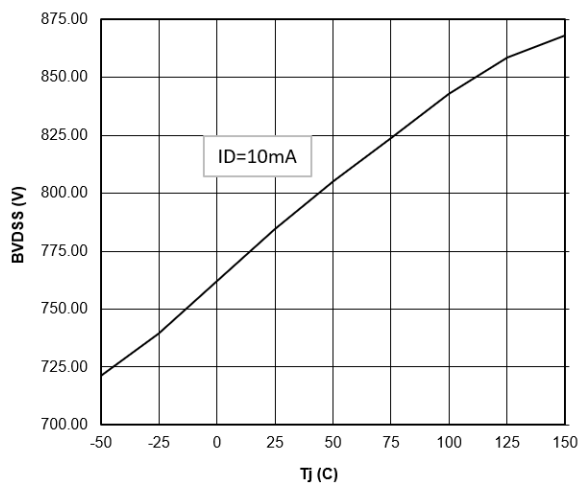
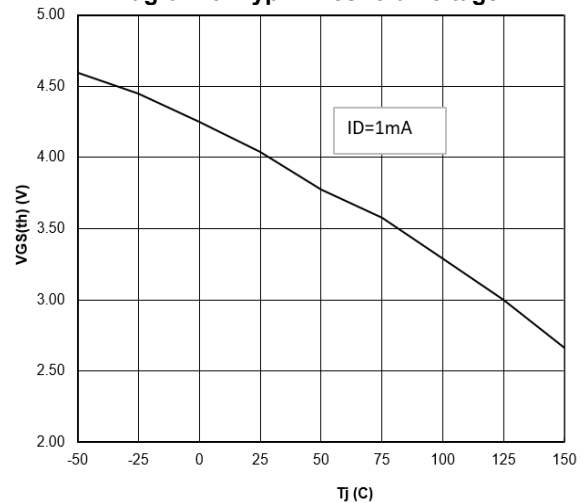
**650V Super Junction Power MOSFET**

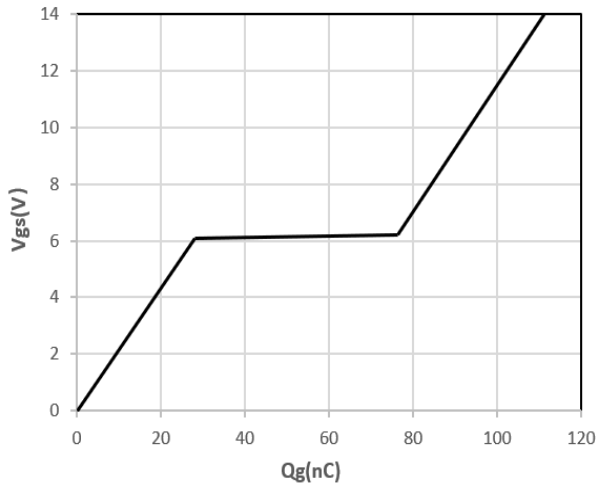
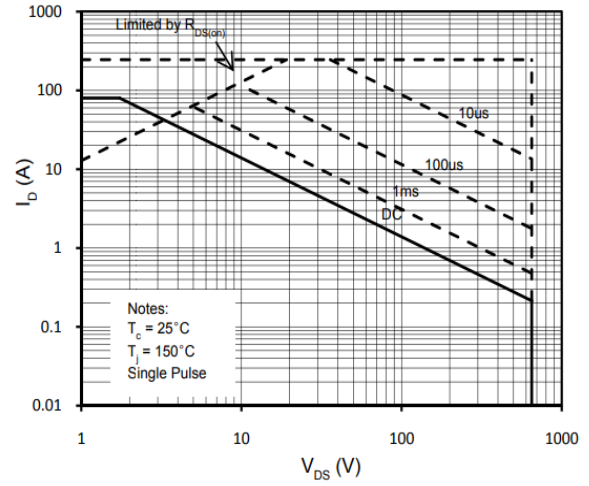
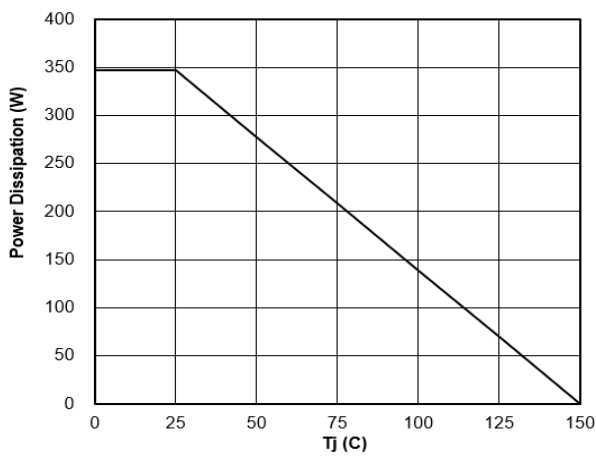
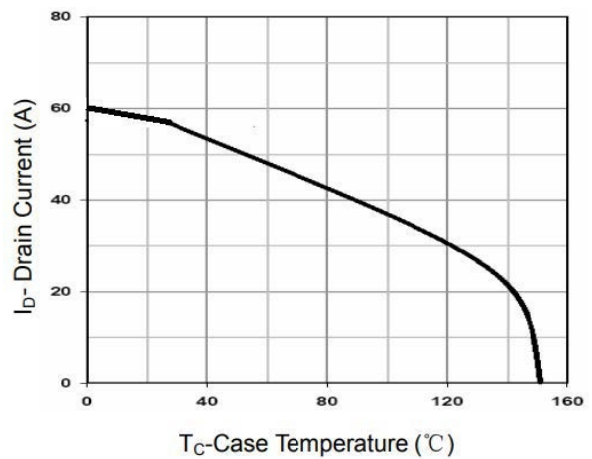
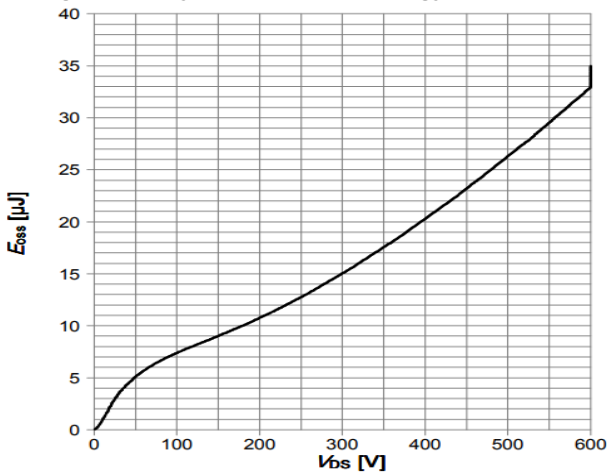
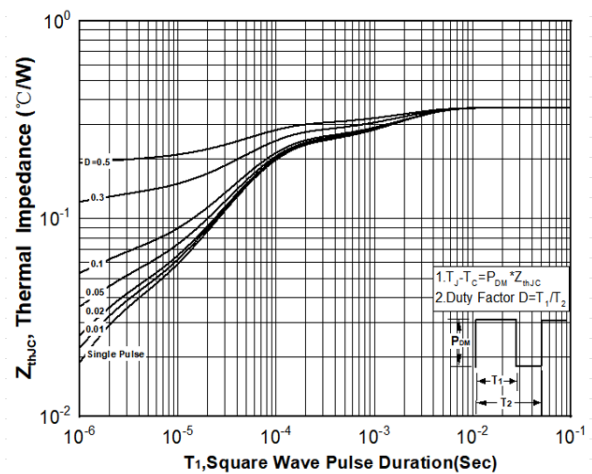
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$ , Unless Otherwise Noted)

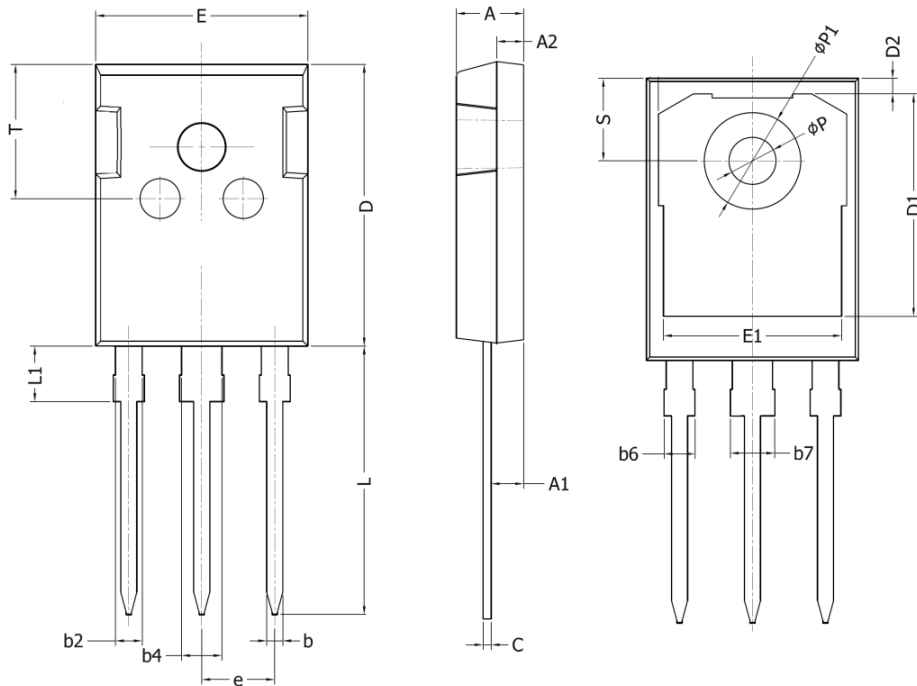
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Static Electrical Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	650	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	---	---	3	$\mu A$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0	---	5.0	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	$\pm 100$	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_D=29.4A$	---	38	46	$m\Omega$
<b>Dynamic Characteristics</b> <sup>⑤</sup>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=100V,$ $Freq.=1MHz$	---	5300	---	pF
$C_{oss}$	Output Capacitance		---	102	---	
$C_{riss}$	Reverse Transfer Capacitance		---	11	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DD}=400V,$ $R_G=1.8\Omega,$ $I_D=44.2A$	---	14.4	---	nS
$T_r$	Turn-on Rise Time		---	35.1	---	
$T_{d(off)}$	Turn-off Delay Time		---	86.2	---	
$T_f$	Turn-off Fall Time		---	6.4	---	
$Q_g$	Total Gate Charge	$V_{DS}=480V,$ $V_{GS}=10V,$ $I_D=44.2A$	---	110	---	nC
$Q_{gs}$	Gate-Source Charge		---	28	---	
$Q_{gd}$	Gate-Drain Charge		---	48	---	
<b>Source-Drain Characteristics</b> ( $T_J=25^{\circ}\text{C}$ )						
$V_{SD}$ <sup>④</sup>	Diode Forward Voltage	$I_F=1A, V_{GS}=0V$	---	0.65	---	V
$t_{rr}$	Reverse Recovery Time	$V_R=400V, I_F=44.2A, di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$	---	168	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	1.44	---	nC

Note ④ : Pulse test (pulse width $\leq 300\mu s$ , duty cycles $\leq 2\%$ ).

Note ⑤ : Guaranteed by design, not subject to production testing.

**650V Super Junction Power MOSFET**
**输出特性、转移特性、体二极管特性、电容特性、击穿电压、阈值电压**
**Diagram 1: Typ. Output characteristics**

**Diagram 2: Typ. transfer characteristics**

**Diagram 3: Typ. Body-Diode Characteristics**

**Diagram 4: Typ. Capacitance vs. Vds**

**Diagram 5: Typ. Drain-source breakdown voltage**

**Diagram 6: Typ. Threshold voltage**


**650V Super Junction Power MOSFET**
**Diagram 7: Typ. Gate charge**

**Diagram 8: Typ. Maximum Safe Operating Area**

**Diagram 9: Typ. Power Dissipation**

**Diagram 10: Typ. Drain Current De-rating**

**Diagram 11: Typ. Coss stored energy**

**Diagram 12: Typ. Max. transient thermal impedance**


**650V Super Junction Power MOSFET**
**TO-247 Package Outline Dimensions**


Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.90	5.20
A1	2.31	2.51
A2	1.9	2.1
b	1.16	1.26
b2	1.96	2.06
b4	2.96	3.06
b6	-	2.25
b7	-	3.25
C	0.59	0.66
D	20.90	21.20
D1	16.25	16.85
D2	1.05	1.35
E	15.75	16.10
E1	13.00	13.60
e	5.436 BSC	
L	19.80	20.20
L1	-	4.30
P	3.40	3.60
P1	7.00	7.40
S	6.05	6.25
T	9.80	10.20



## 印字说明

### 印字说明

FS65R046BGD

AABBCC

第一行标记为物料型号代码

第二行为AA为内部识别码，BB为表示年份，例如22即表示2022年，CC表示周期，例如01即表示第一周；2201即表示2022年第一周生产。