

650V Super Junction Power MOSFET

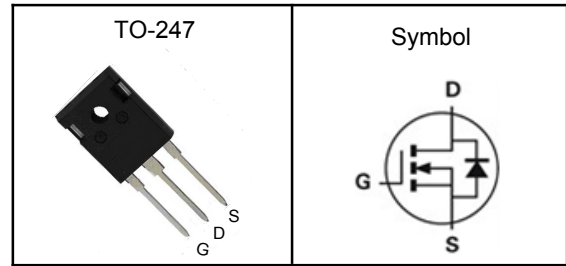
Features

- Low drain-source on-resistance: $R_{DS(on)}=0.053(\Omega_{typ})$
- Very Low FOM ($R_{DS(on)} \times Q_g$)
- Extremely low switching loss
- 100% avalanche tested
- RoHS compliant

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

Pin Description



V_{DSS}	650	V
$R_{DS(on)-Typ}$	53	m Ω
I_D	50	A

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

Symbol	Parameter	Rating	Unit
V_{DSS}	Drain-Source Voltage	650	V
V_{GSS}	Gate-Source Voltage	± 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 ³	281	mJ
$I_{DM}^{①}$	300 μs Pulse Drain Current Tested	129	A
I_D	Continuous Drain Current	50	A
P_D	Maximum Power Dissipation	329	W
I_{AS}	Avalanche Current	6.6	A
E_{AR}	Repetitive Avalanche Energy	3.3	mJ
dv/dt	MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 400\text{V}$	50	V/ns
	Reverse diode dv/dt ³ $V_{DS}=0 \dots 400\text{V}$, $I_{SD} \leq I_D$	15	

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}^{③}$	Thermal Resistance Junction-Ambient ₁ (Max)	40	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ₁ (Max)	0.38	$^\circ\text{C}/\text{W}$

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 1in² FR-4 board with 1oz.

**650V Super Junction Power MOSFET****Electrical Characteristics** ($T_J=25^\circ\text{C}$, Unless Otherwise Noted)

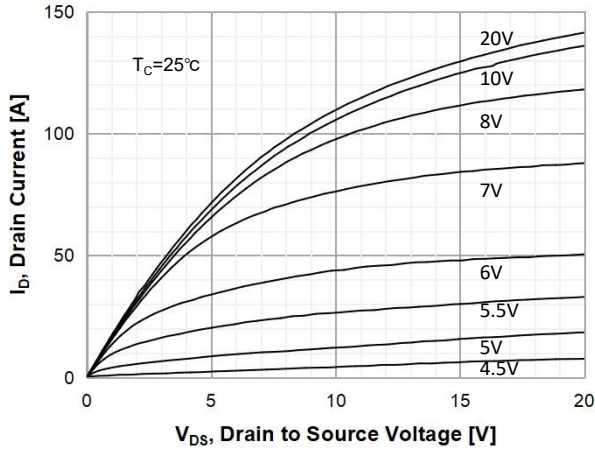
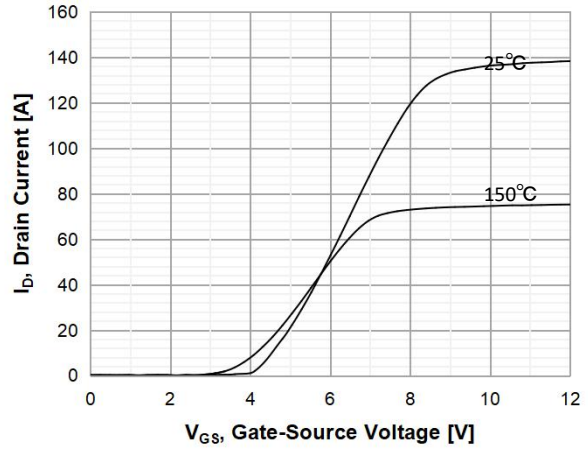
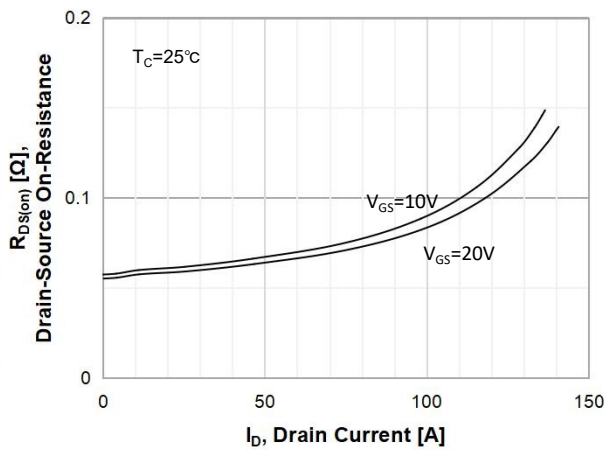
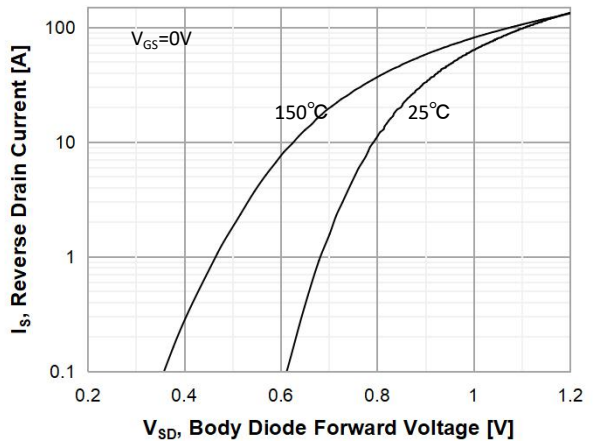
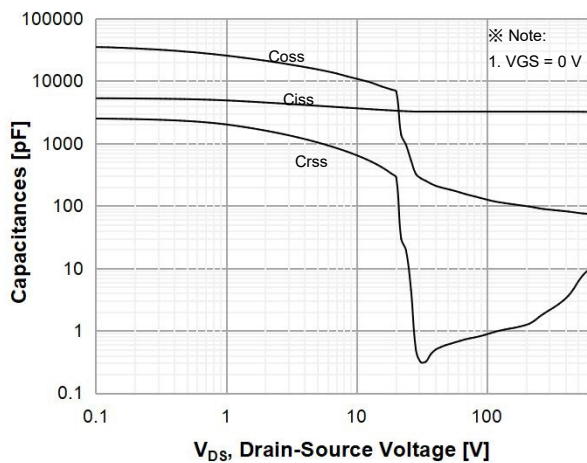
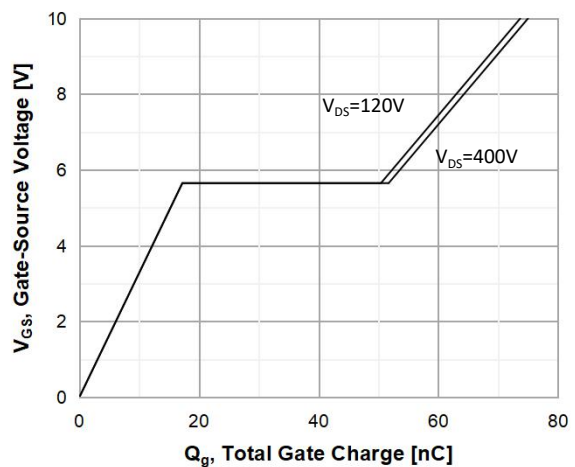
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	650	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=600V, V_{GS}=0V$	---	---	1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	---	4.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	± 100	nA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_D=25A$	---	53	65	m Ω
R_G	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	1.3	---	Ω
Dynamic Characteristics ^⑤						
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=50V,$ Freq.=1MHz	---	3200	---	pF
C_{oss}	Output Capacitance		---	80	---	
C_{riss}	Reverse Transfer Capacitance		---	2	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DS}=400V, R_G=10\Omega,$ $I_D=25A, V_{GS}=10V$	---	17	---	nS
T_r	Turn-on Rise Time		---	8	---	
$T_{d(off)}$	Turn-off Delay Time		---	70	---	
T_f	Turn-off Fall Time		---	9	---	
Q_g	Total Gate Charge	$V_{DS}=400V, V_{GS}=10V,$ $I_D=25A$	---	75	---	nC
Q_{gs}	Gate-Source Charge		---	17	---	
Q_{gd}	Gate-Drain Charge		---	34	---	
Source-Drain Characteristics ($T_J=25^\circ\text{C}$)						
V_{SD} ^④	Diode Forward Voltage	$I_S=25A, V_{GS}=0V$	---	0.7	1.2	V
t_{rr}	Reverse Recovery Time	$V_R=400V, I_F=25A,$ $di/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	410	---	nS
Q_{rr}	Reverse Recovery Charge		---	7	---	nC

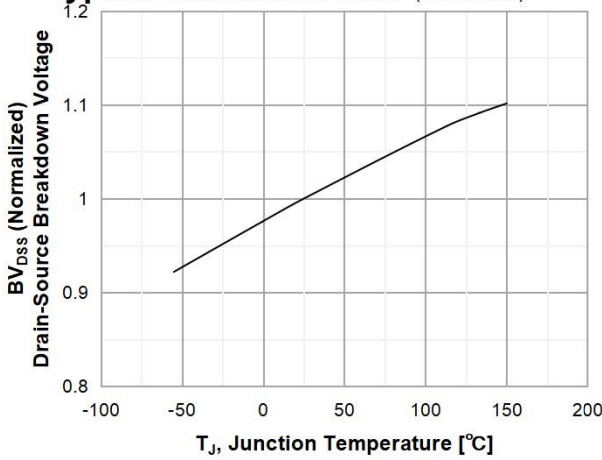
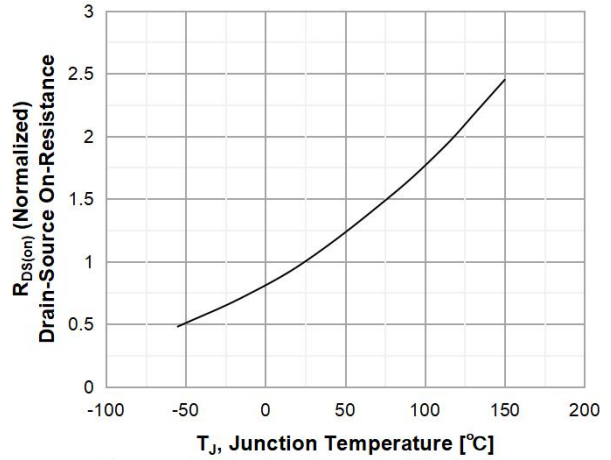
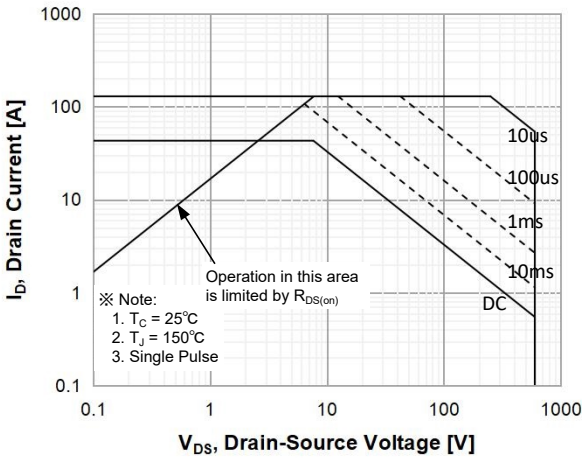
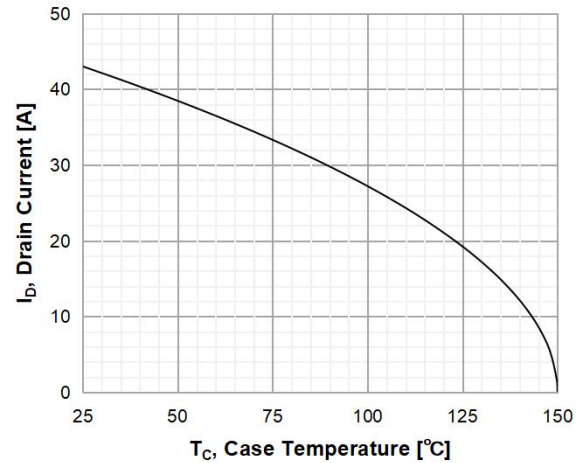
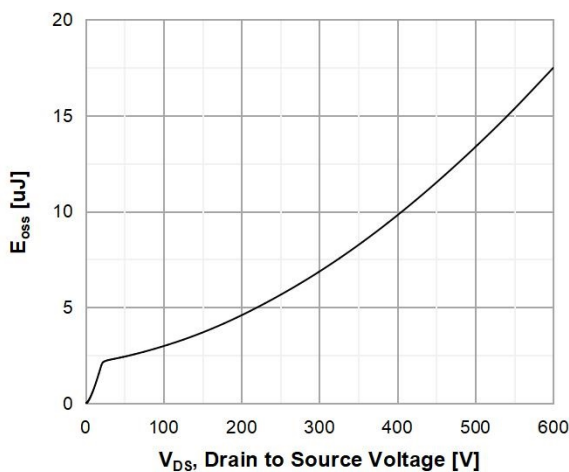
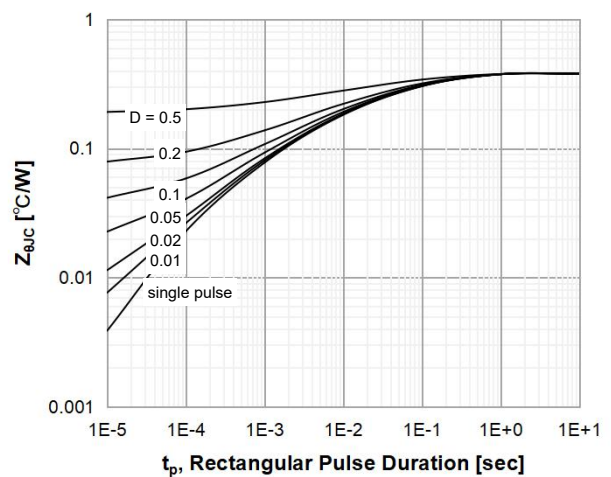
Note ④ : Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).

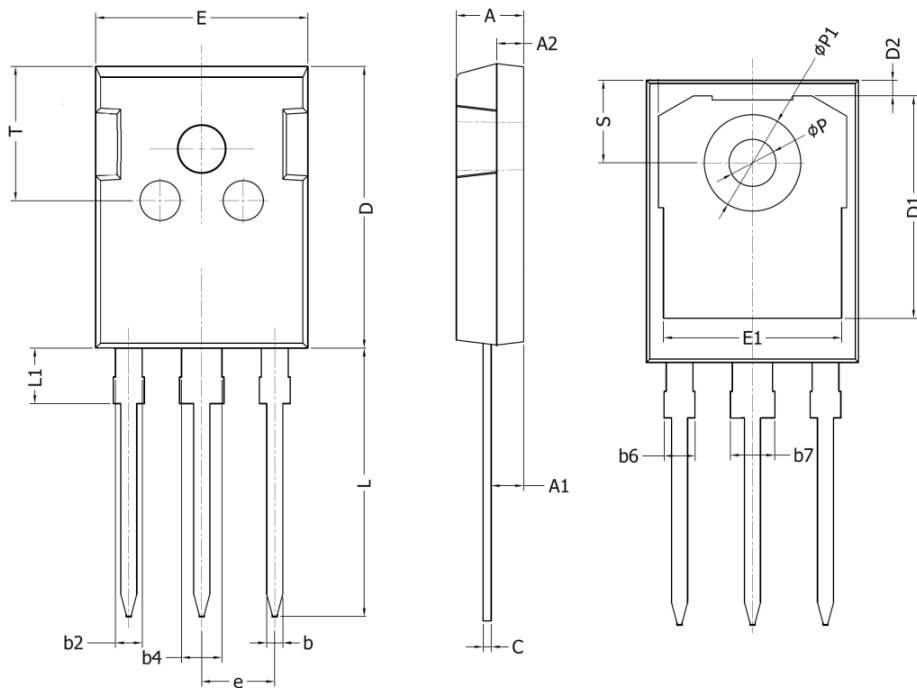
Note ⑤ : Guaranteed by design, not subject to production testing.

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Typical Characteristics


Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics

Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

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Typical Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs Temperature

Figure 8. On-Resistance Variation vs Temperature

Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

Figure 11. E_{oss} vs. Drain to Source Voltage

Figure 12. Transient Thermal Response Curve

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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

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FS65R065IG

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。