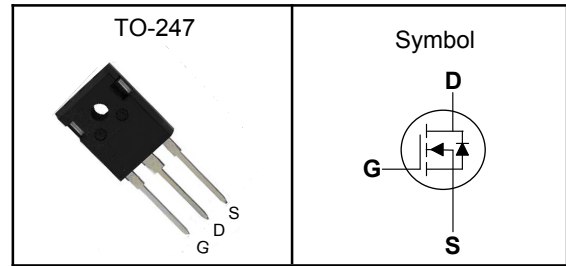


650V Super Junction Power MOSFET
Features

- Low drain-source on-resistance: $R_{DS(ON)}=0.030\Omega(\text{typ})$
- Easy to control gate switching
- Enhancement mode: $V_{th} = 3$ to $4.5V$
- 100% avalanche tested
- RoHS compliant

Applications

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

Pin Description


V_{DSS}	650	V
$R_{DS(ON)-Typ}$	30	m Ω
I_D	80	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 175	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$	
E_{AS}	Single Pulse Avalanche Energy	82	mJ	
$I_{DM}^{①}$	Pulse Drain Current Tested	320	A	
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	80	A
	Continuous Drain Current	$T_C=100^\circ\text{C}$	40	A
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	680	W

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	33	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.19	$^\circ\text{C}/\text{W}$

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

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°C .

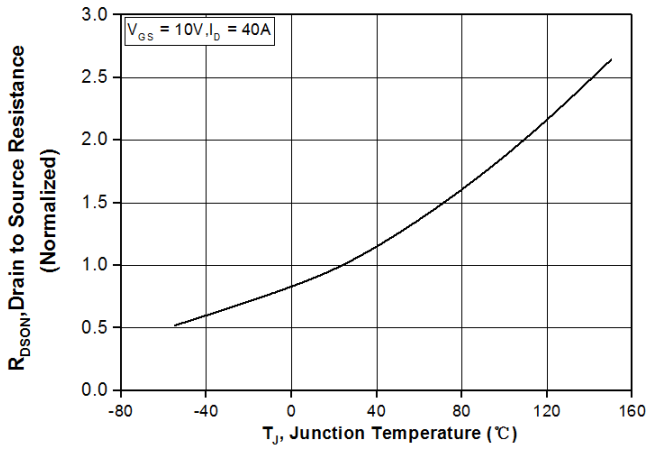
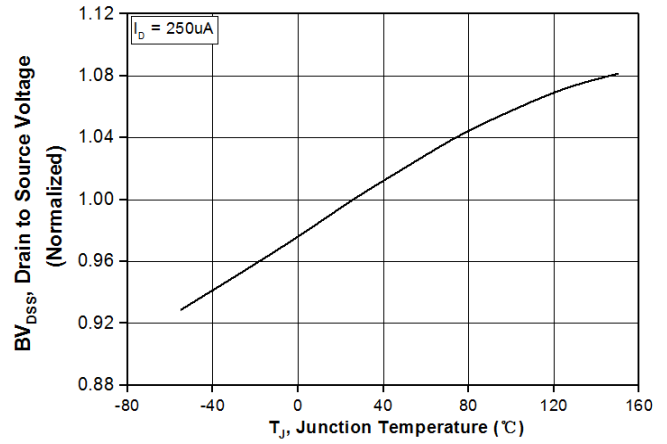
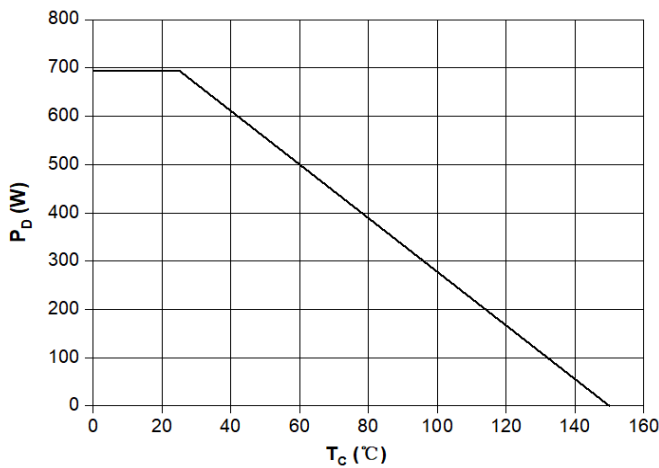
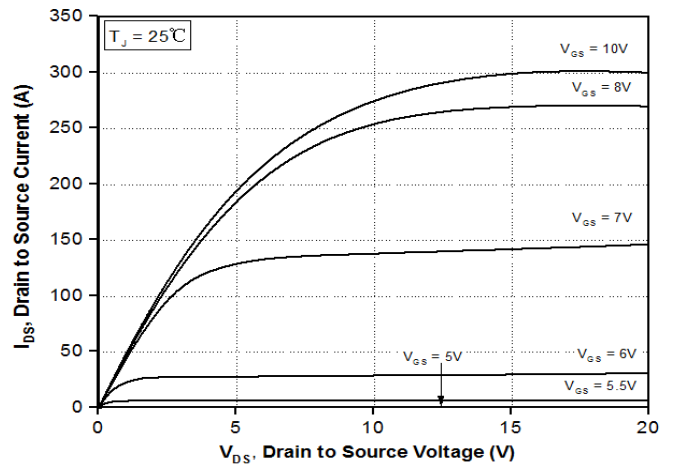
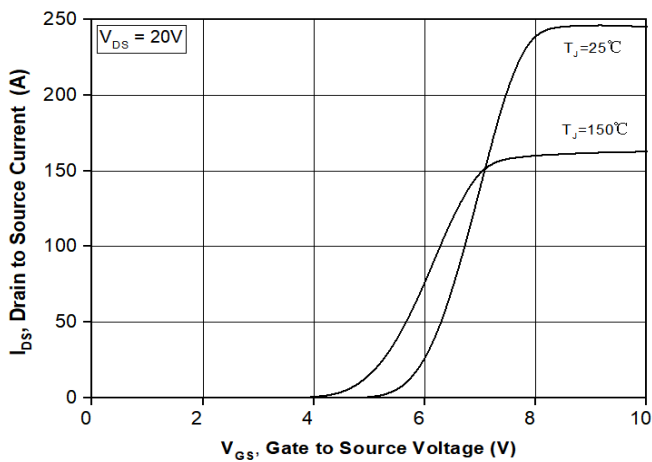
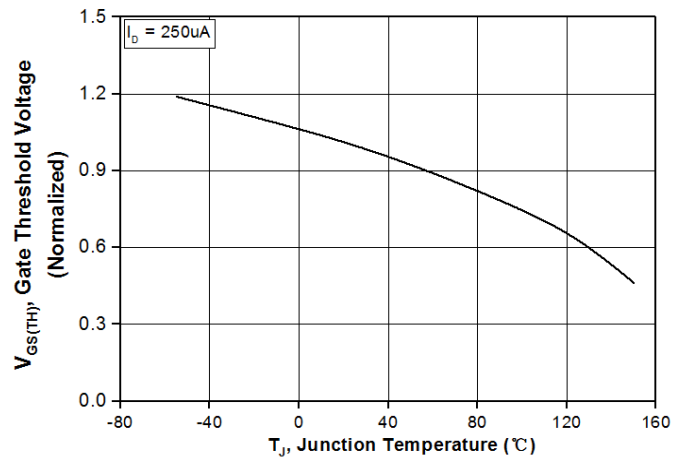
Note ③ : Surface Mounted on 1in^2 FR-4 board with 1oz.

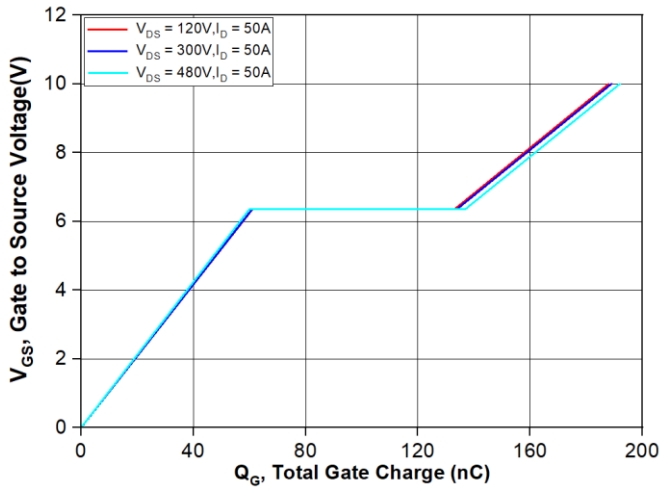
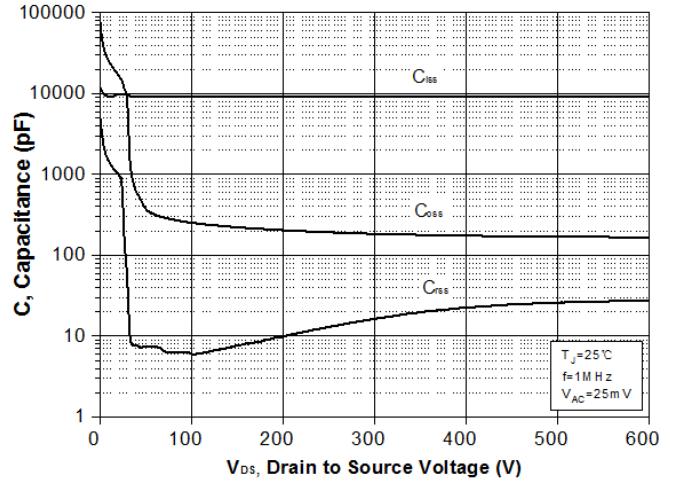
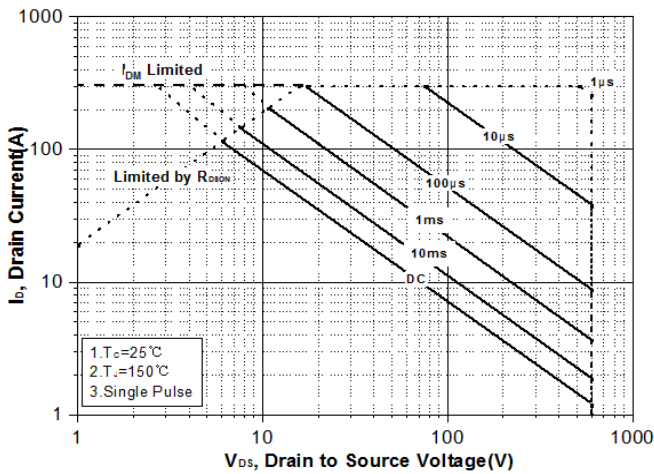
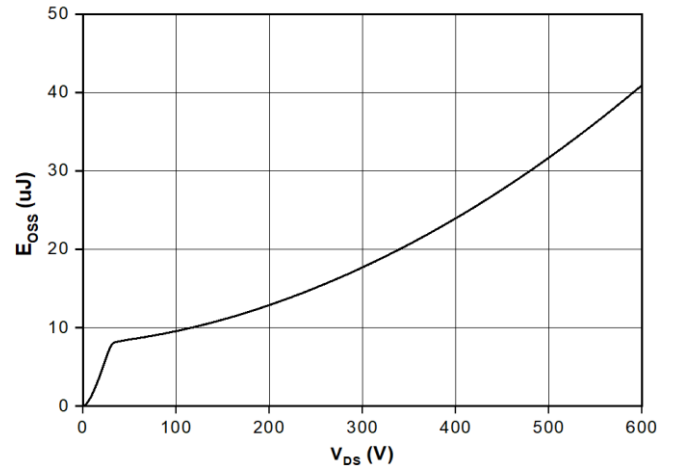
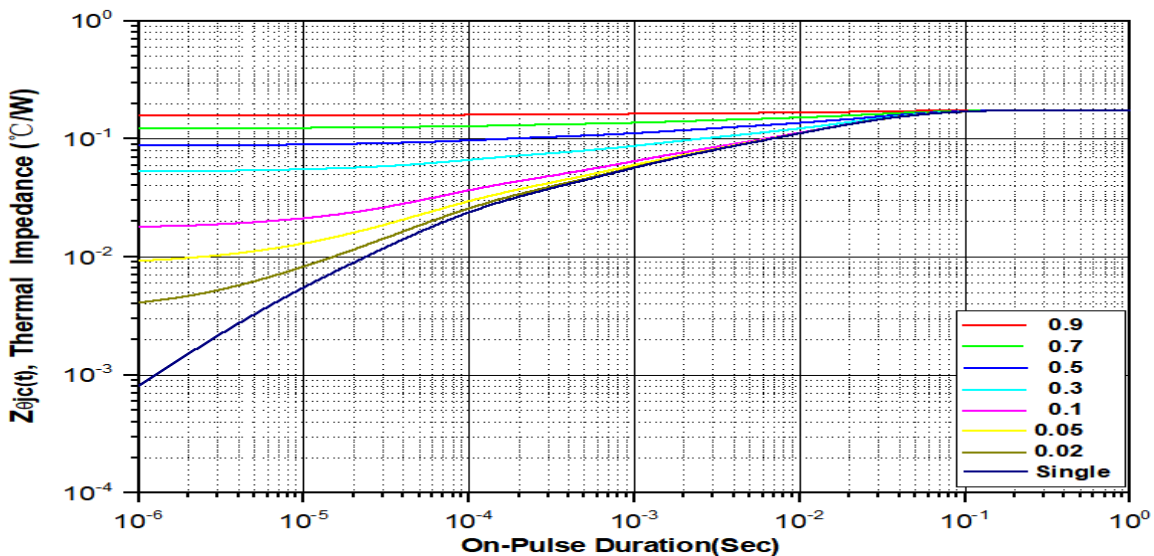
**650V Super Junction Power MOSFET****Electrical Characteristics** ($T_J=25^\circ\text{C}$, Unless Otherwise Noted)

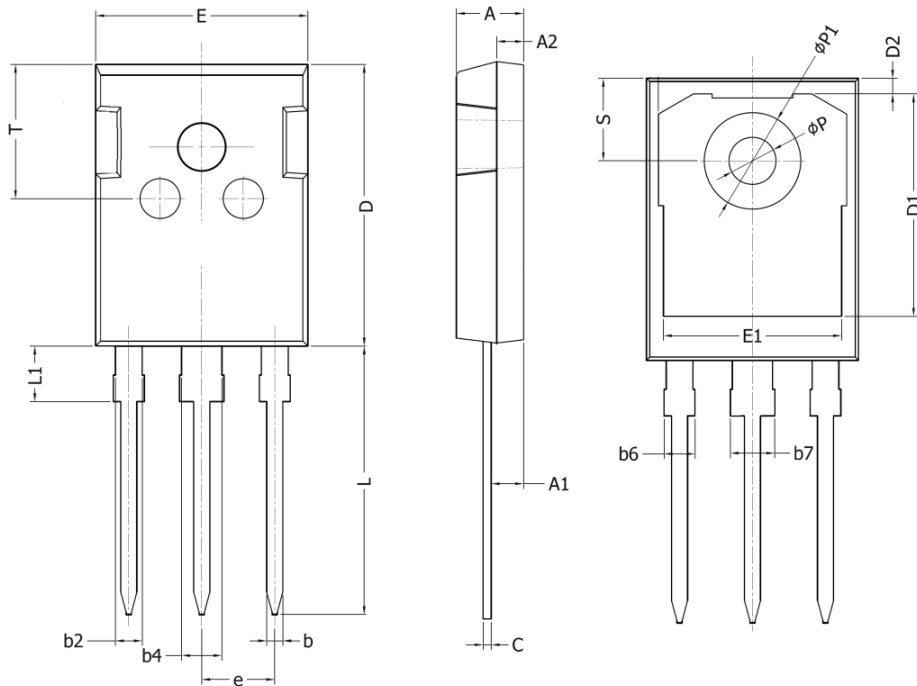
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	650	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	---	---	10	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0	---	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	$V_{GS}=10V, I_D=40A$	---	30	38	m Ω
Dynamic Characteristics ^⑤						
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=50V,$ Freq.=1.0MHz	---	9320	---	pF
C_{oss}	Output Capacitance		---	377	---	
C_{rss}	Reverse Transfer Capacitance		---	8	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{GS}=10V, V_{DS}=325V,$ $I_D=40A, R_G=25\Omega$	---	198	---	nS
T_r	Turn-on Rise Time		---	97	---	
$T_{d(off)}$	Turn-off Delay Time		---	473	---	
T_f	Turn-off Fall Time		---	112	---	
Q_g	Total Gate Charge	$V_{GS}=10V, V_{DS}=520V,$ $I_D=40A$	---	190	---	nC
Q_{gs}	Gate-Source Charge		---	57	---	
Q_{gd}	Gate-Drain Charge		---	75	---	
Source-Drain Characteristics						
V_{SD}	Diode Forward Voltage	$I_S=40A, V_{GS}=0V$	---	---	1.2	V

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

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

650V Super Junction Power MOSFET
Typical Characteristics

Fig 1. $R_{DS(ON)}$ vs junction temperature

Fig 2. BV_{DS} vs junction temperature

Fig 3 . Power dissipation

Fig 4. Output characteristics $T_J = 25^\circ\text{C}$

Fig 5 . Transfer characteristics

Fig 6 . $V_{GS(TH)}$ vs junction temperature

650V Super Junction Power MOSFET

Fig 7. Gate charge characteristics

Fig 8. Capacitance Characteristics

**Fig 9. Safe operating area(TO-247)
Tc= 25°C**

Fig 10 . E_{OSS} vs Drain-Source Voltage

Fig 11. 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