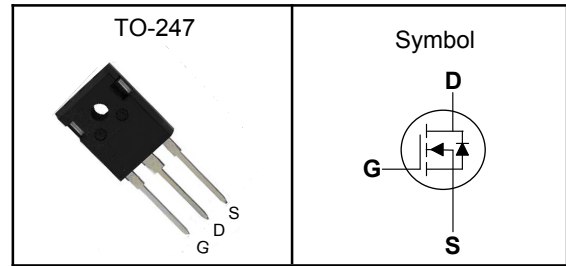


650V Super Junction Power MOSFET
Features

- Low drain-source on-resistance: $R_{DS(ON)}=0.026\Omega(\text{typ})$
- Easy to control gate switching
- Enhancement mode: $V_{th} = 3$ to $5V$
- 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
$R_{DS(ON)-Typ}$	26	m Ω
I_D	87	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	1500	mJ
$I_{DM}^{①}$	300 μs Pulse Drain Current Tested	261	A
I_D	Continuous Drain Current	87	A
P_D	Maximum Power Dissipation	425	W
I_{AS}	Avalanche Current	10	A
dv/dt	MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 400V$	50	V/ns
	Reverse diode dv/dt ³ $V_{DS}=0 \dots 400V, I_{SD} \leq I_D$	15	

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}^{③}$	Thermal Resistance Junction-Ambient ¹	62	$^\circ\text{C}/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	0.29	$^\circ\text{C}/W$

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

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°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	$V_{DS}=650V, V_{GS}=0V$	---	---	1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=5mA$	3.0	---	5.0	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	± 100	nA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_D=37.5A$	---	26	30	m Ω
Dynamic Characteristics ^⑤						
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=100V,$ Freq.=500kHz	---	8100	---	pF
C_{oss}	Output Capacitance		---	330	---	
C_{riss}	Reverse Transfer Capacitance		---	1	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{GS}=10V, V_{DD}=400V,$ $I_D=37.5A, R_G=2.7\Omega$	---	37	---	nS
T_r	Turn-on Rise Time		---	15	---	
$T_{d(off)}$	Turn-off Delay Time		---	130	---	
T_f	Turn-off Fall Time		---	12	---	
Q_g	Total Gate Charge	$V_{GS}=10V, V_{DD}=400V, I_D=37.5A$	---	209	---	nC
Q_{gs}	Gate-Source Charge		---	60	---	
Q_{gd}	Gate-Drain Charge		---	88	---	
R_g	Gate resistance	f=1 MHz, open drain	---	1	---	Ω
Source-Drain Characteristics						
I_S	Continuous Source Current		---	---	87	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		---	---	216	A
V_{SD}	Diode Forward Voltage	$I_S=37.5A, V_{GS}=0V$	---	---	1.4	V
t_{rr}	Reverse recovery time	$I_S=37.5A, V_{GS}=0V$ $diF/dt=100A/\mu s$	---	235	---	ns
Q_{rr}	Reverse recovery charge		---	2.3	---	nC
I_{rrm}	Peak Reverse Recovery Current		---	20	---	A

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

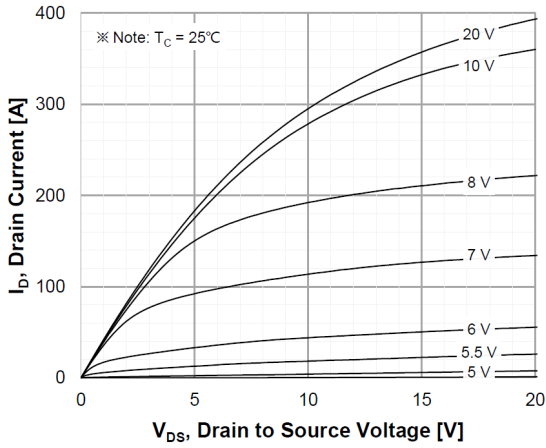
Note ⑤: Guaranteed by design, not subject to production testing.



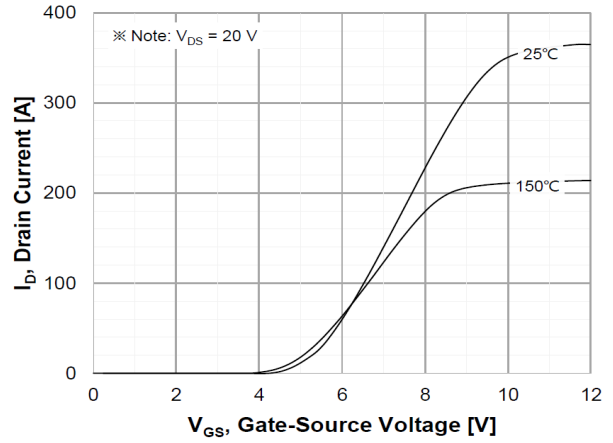
650V Super Junction Power MOSFET

Typical Characteristics

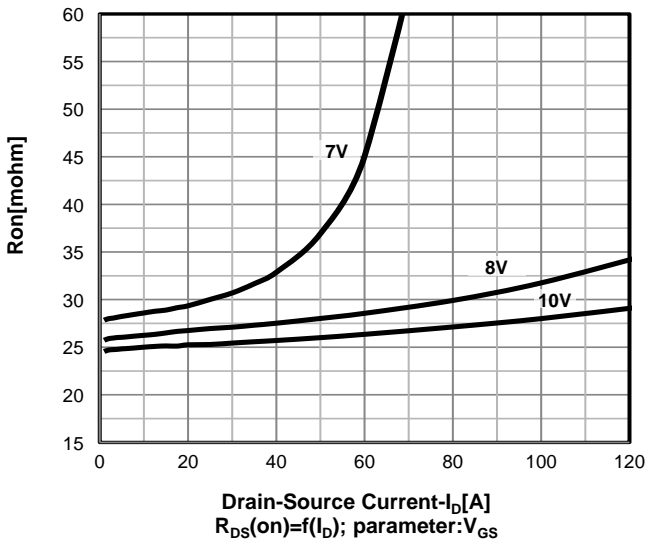
Typ. output characteristics $T_f=25\text{ }^\circ\text{C}$



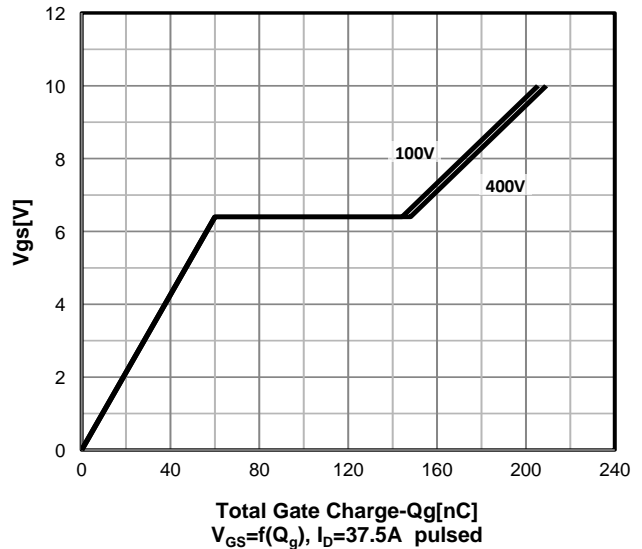
Transfer characteristics



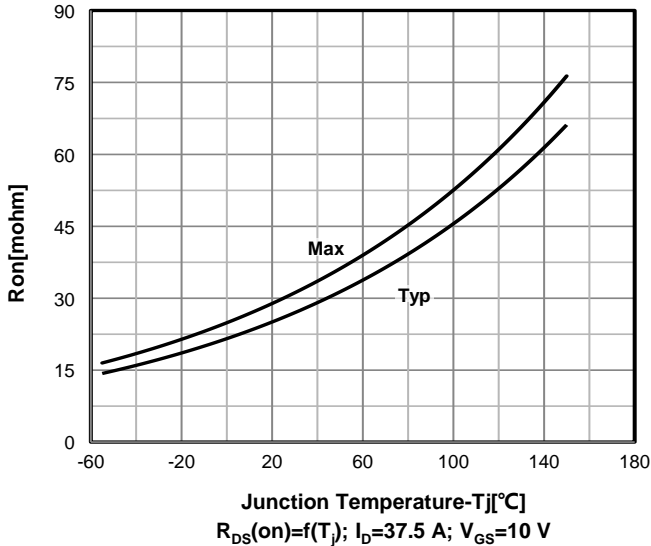
Typ. drain-source on-state resistance



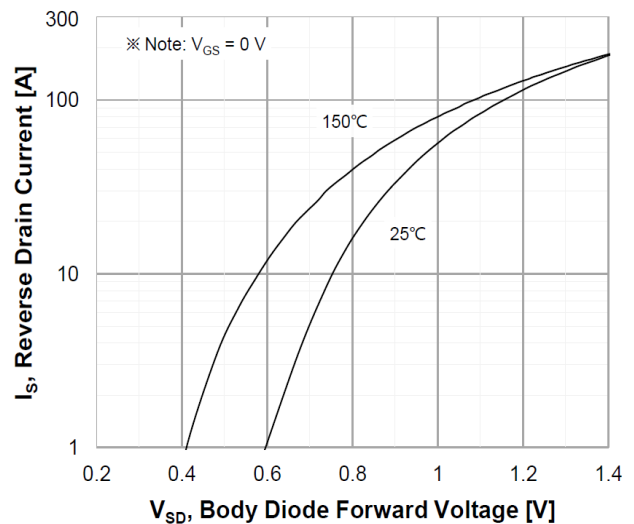
Typ. gate charge characteristics



On-resistance vs temperature



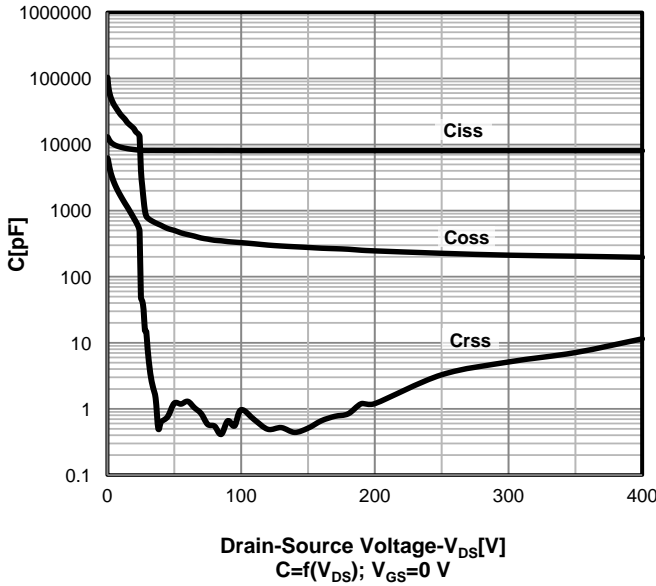
Forward characteristics of reverse diode



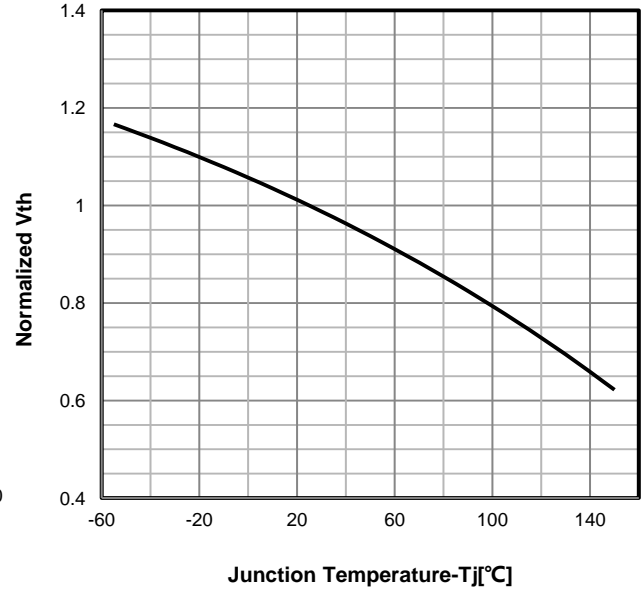


650V Super Junction Power MOSFET

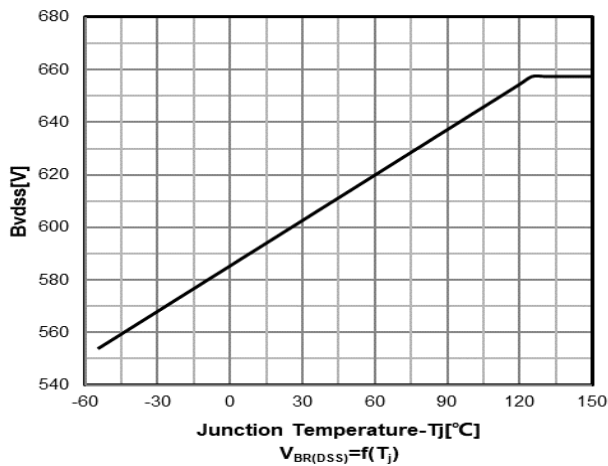
Typ. capacitances



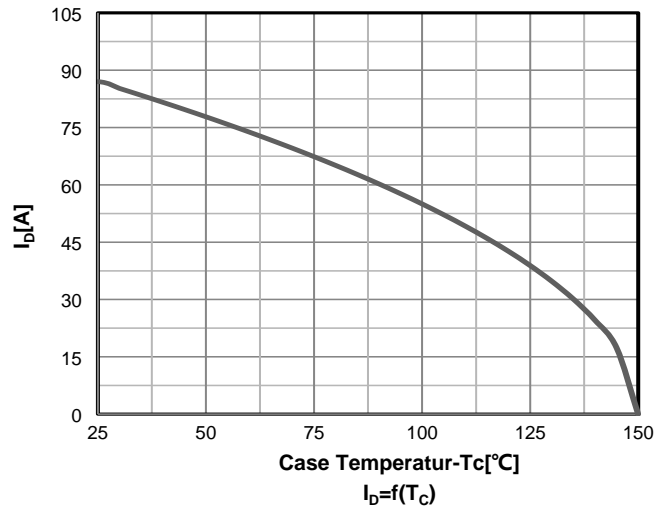
Normalized $V_{GS(th)}$ characteristics



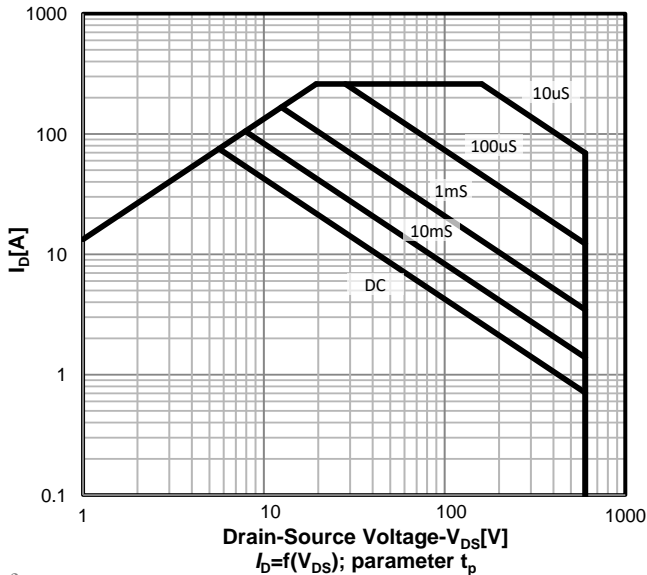
Drain-source breakdown voltage



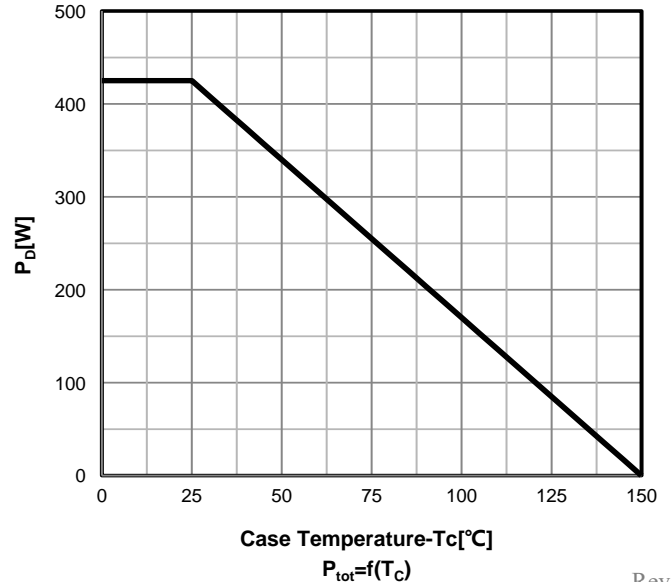
Drain current vs temperature

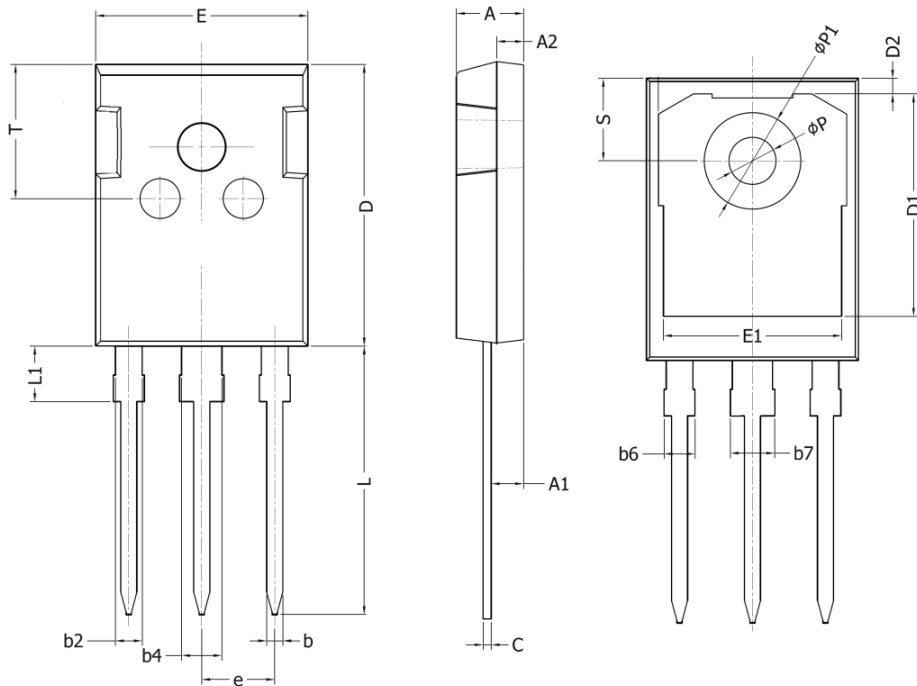


Safe operating area TC=25 °C



Power dissipation



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