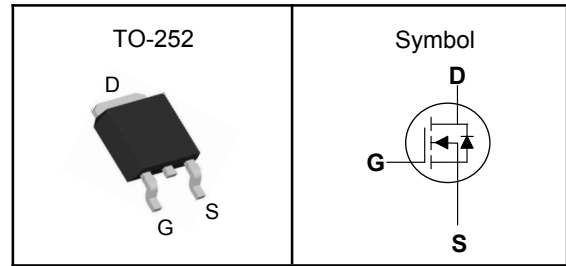


650V Super Junction Power MOSFET
Features

- Low drain-source on-resistance: $R_{DS(ON)}=0.33\Omega(\text{typ})$
- Easy to control gate switching
- Enhancement mode: $V_{th} = 2$ to $4V$
- 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
$R_{DS(ON)-Typ}$	330	m Ω
I_D	11	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	± 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	320	mJ
$I_{DM}^{①}$	Pulse Drain Current Tested	30	A
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	A
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	W

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ^①	1.6	$^\circ\text{C}/\text{W}$

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.



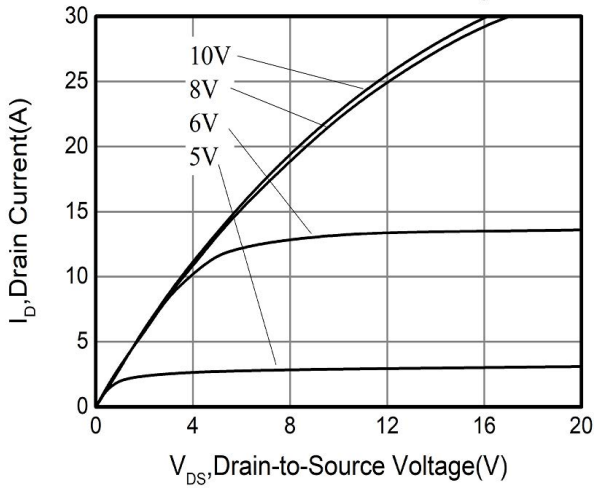
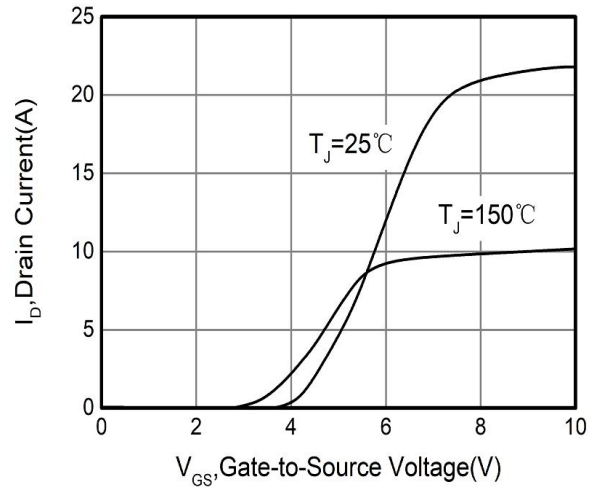
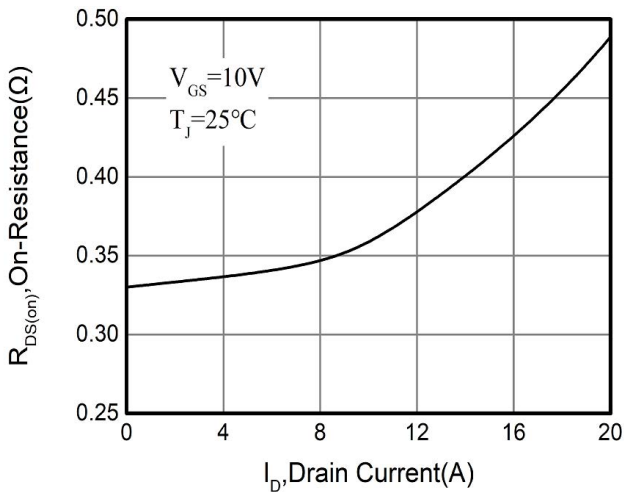
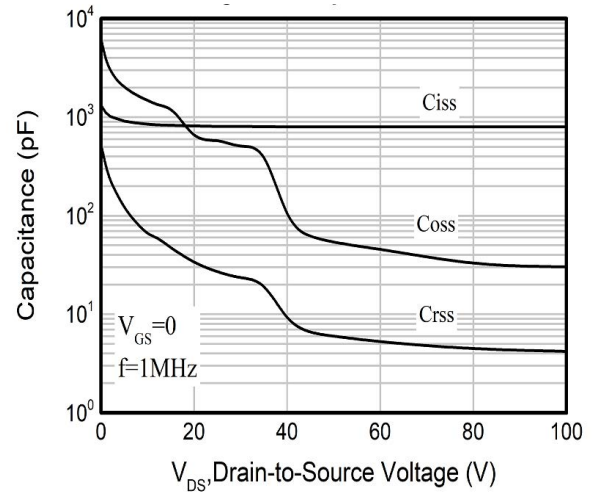
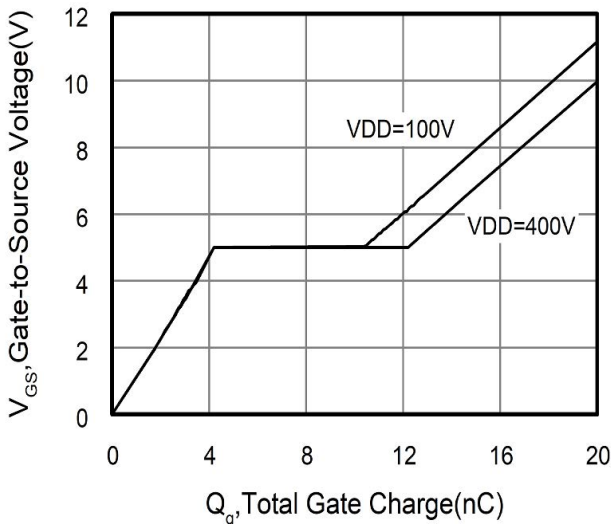
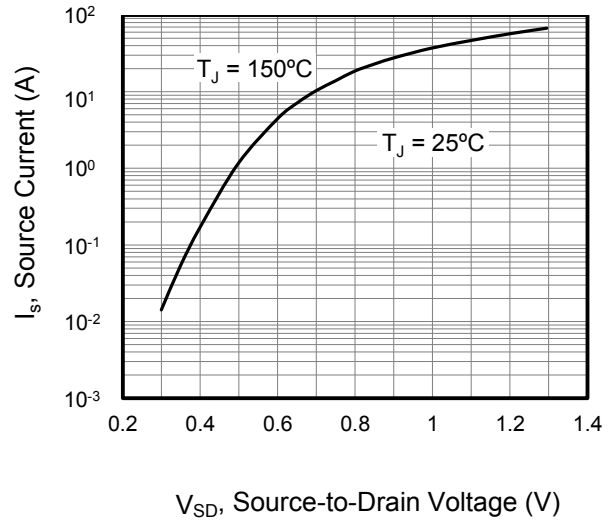
650V Super Junction Power MOSFET

Electrical Characteristics (T_J=25°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 =250uA	650	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =600V, V _{GS} =0V	---	---	1	uA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2	---	4	V
I _{GSS}	Gate Leakage Current	V _{GS} =±30V, V _{DS} =0V	---	---	±100	nA
R _{DS(ON)}	Drain-Source On-state Resistance	V _{GS} =10V, I _D =5.5A	---	330	400	mΩ
Dynamic Characteristics ^⑤						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =100V, Freq.=1MHz	---	785	---	pF
C _{oss}	Output Capacitance		---	30	---	
C _{rss}	Reverse Transfer Capacitance		---	4.2	---	
T _{d(on)}	Turn-on Delay Time	V _{DD} =400V, V _{GS} =10V, R _G =25Ω, I _D =5.5A	---	41	---	nS
T _r	Turn-on Rise Time		---	20	---	
T _{d(off)}	Turn-off Delay Time		---	120	---	
T _f	Turn-off Fall Time		---	20	---	
R _g	Gate Resistance	f = 1.0MHz, open drain	---	14	---	Ω
Q _g	Total Gate Charge	V _{DS} =400V, V _{GS} =10V, I _D =5.5A	---	20	---	nC
Q _{gs}	Gate-Source Charge		---	4.2	---	
Q _{gd}	Gate-Drain Charge		---	7	---	
Source-Drain Characteristics (T _J =25°C)						
V _{SD} ^④	Diode Forward Voltage	I _S =5.5A, V _{GS} =0V	---	0.8	1.2	V
t _{rr}	Reverse Recovery Time	V _R =400V, I _F =5.5 A, di/dt=100A/μs, T _J =25°C	---	330	---	nS
Q _{rr}	Reverse Recovery Charge		---	3.5	---	nC

Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

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

650V Super Junction Power MOSFET
Typical Characteristics

Figure 1. Output Characteristics

Figure 2. Transfer Characteristics

Figure 3. On-Resistance vs. Drain Current

Figure 4. Capacitance

Figure 5. Gate-to-Source Voltage vs. Total Gate Charge

Figure 6. Body Diode Forward Voltage

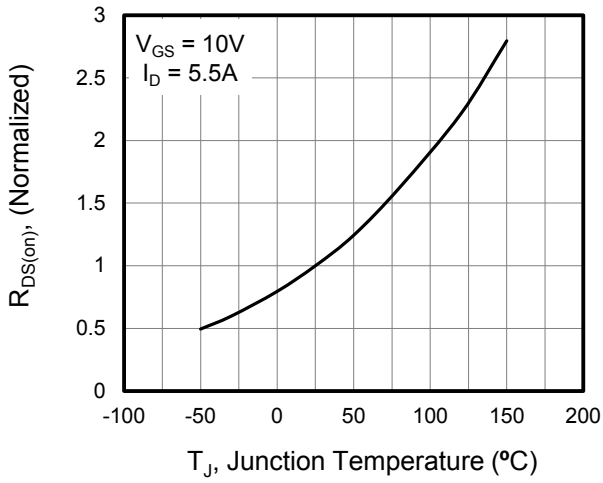
650V Super Junction Power MOSFET


Figure 7. On-Resistance vs. Junction Temperature

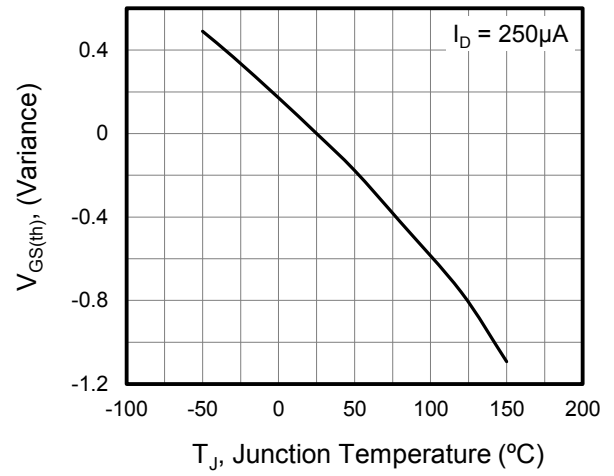


Figure 8. Threshold Voltage vs. Junction Temperature

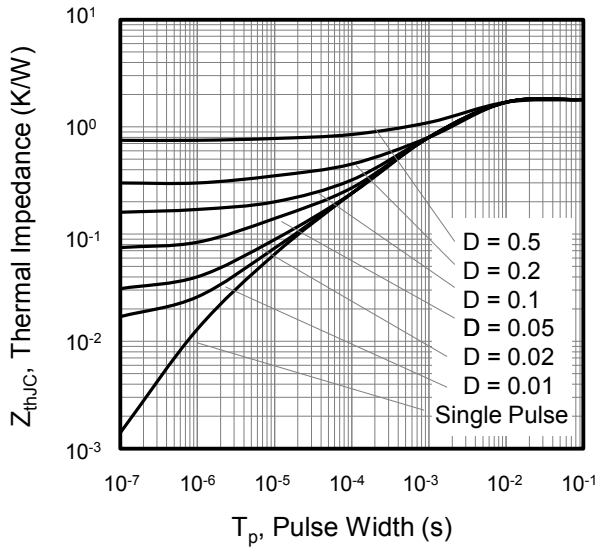
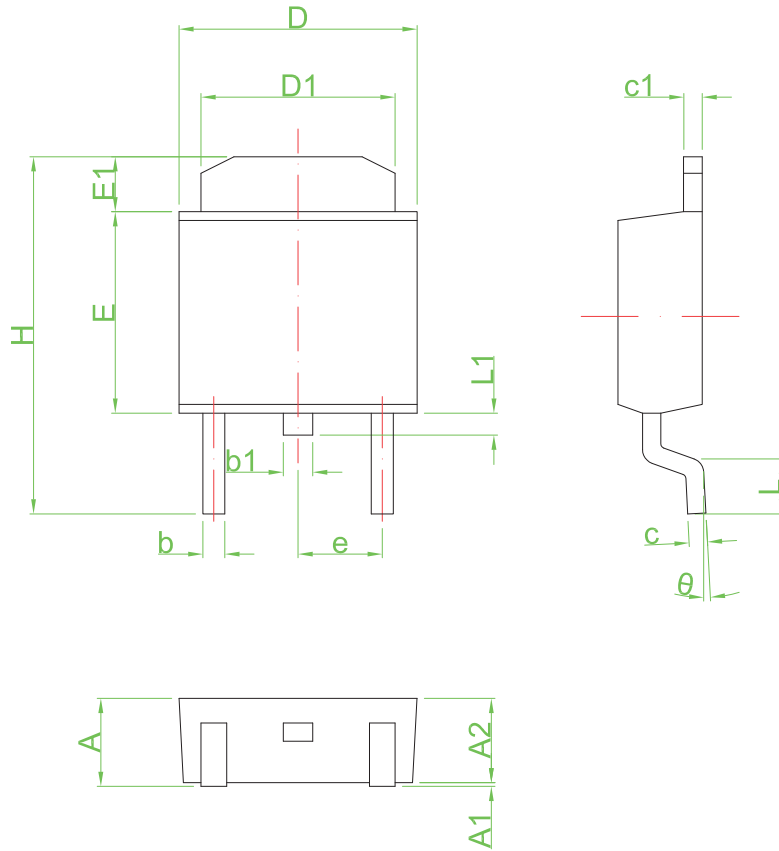


Figure 9. Transient Thermal Impedance

650V Super Junction Power MOSFET
TO-252 Package Outline Dimensions


Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	2.25	2.65	0.089	0.104
A1	0.00	0.15	0.000	0.006
A2	2.20	2.40	0.087	0.094
b	0.50	0.70	0.020	0.028
b1	0.70	0.90	0.028	0.035
c	0.46	0.66	0.018	0.026
c1	0.46	0.66	0.018	0.026
D	6.30	6.70	0.248	0.264
D1	5.20	5.40	0.205	0.213
E	5.30	5.70	0.209	0.224
E1	1.40	1.60	0.055	0.063
H	9.40	9.90	0.370	0.390
e	2.30 TYP		0.09 TYP	
L	1.40	1.77	0.055	0.070
L1	0.50	0.70	0.020	0.028
θ	0°	8°	0°	8°