MOSPEC

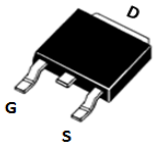
11N650E

650V N-Channel Power MOSFET

DESCRIPTION：
- Very low FOM RDS(on)×Qg
- 100% avalanche tested
- Easy to use/drive
- RoHS complian

V_{DSS}	650V
I_D	11A
$R_{DS(ON)_Typ.}$ @V_{GS}=10V	310mΩ

TYPICAL APPLICATIONS：
- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- Charger



TO-252

MAXIMUM RATINGS (at T_C = 25 °C, unless otherwise specified)

Characteristic	Condition	Symbol	Value	Unit
Drain - Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	Tc=25℃ Tc=100℃	I_D	11 6.6	A
Pulsed Drain Current (1)		I_{DM}	33	A
Single Pulsed Avalanche Energy (2)		E_{AS}	215	mJ
Avalanche Current		I_{AR}	1.8	A
Power dissipation	Tc=25℃	P_D	83	W
Junction & Storage temperature Range		T_J, T_{STG}	-55~+150	℃

Notes： 1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_{AS} = 2.4A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Ambient Junction to Case	$R_{\theta JA}$ $R_{\theta JC}$	62 1.5	℃/W

ELECTRICAL CHARATERISTICS (at T_J = 25 °C, unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage VGS = 0V, ID = 250uA	$V_{(BR)DSS}$	650			V
Zero Gate Voltage Drain Current VDS = 650 V, VGS = 0 V ,Tj=25℃ VDS = 650 V, VGS = 0 V ,Tj=150℃	I_{DSS}		 100	1.0	uA
Gate-Source Leakage Current VGS = ±30V, VDS = 0V	I_{GSS}			±100	nA
Gate-Source threshold voltage VDS = VGS, ID = 250uA	$V_{GS(th)}$	2.5		4.5	V
Drain-Source On-State Resistance VGS = 10V, ID = 5.5A	$R_{DS(on)}$		310	360	mΩ
Diode Forward Voltage VGS = 0V, I_{SD} =11A	V_{SD}		0.9	1.2	V
Gate Resistance f=1MHz	Rg		18		Ω
Input capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{iss}		807		pF
Output capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{oss}		32		pF
Reverse transfer capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{rss}		1.9		pF
Turn-on delay time VDD=400 V, ID=11A, R_{GEN}=25Ω	td (ON)		69.7		ns
Rise time VDD=400 V, ID=11A, R_{GEN}=25Ω	tr		69.5		ns
Turn-off delay time VDD=400 V, ID=11A, R_{GEN}=25Ω	td (OFF)		145		ns
Fall time VDD=400 V, ID=11A, R_{GEN}=25Ω	tf		59		ns
Total Gate Charge VDD= 520V, ID= 10A, VGS= 10V	Q_G		22		nC
Gate to Source Charge VDD= 520V, ID= 11A, VGS= 10V	Q_{GS}		4		nC
Gate to Drain Charge VDD= 520V, ID= 11A, VGS= 10V	Q_{GD}		8		nC
Revers Recovery Time I_F =I_S, VR=400V, di_F/dt = 100A/us ,Tj=25℃	Trr		377		ns
Revers Recovery Charge I_F =I_S, VR=400V, di_F/dt = 100A/us ,Tj=25℃	Qrr		3.4		uC
Continuous Diode Forward Current Tc=25℃	IS			9.4	A

Typical Performance Characteristics

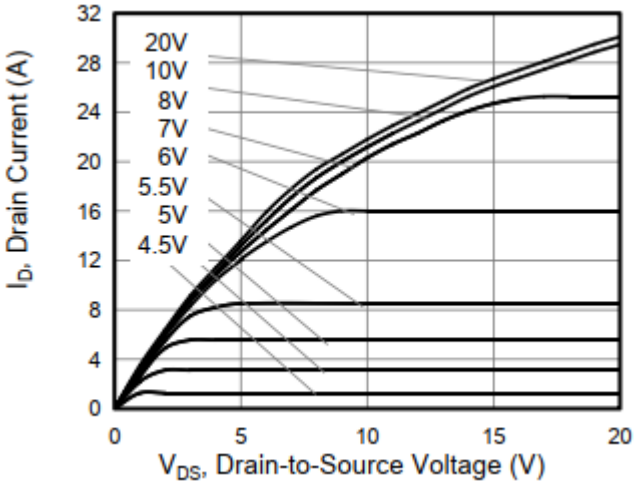


Figure 1. Output Characteristics

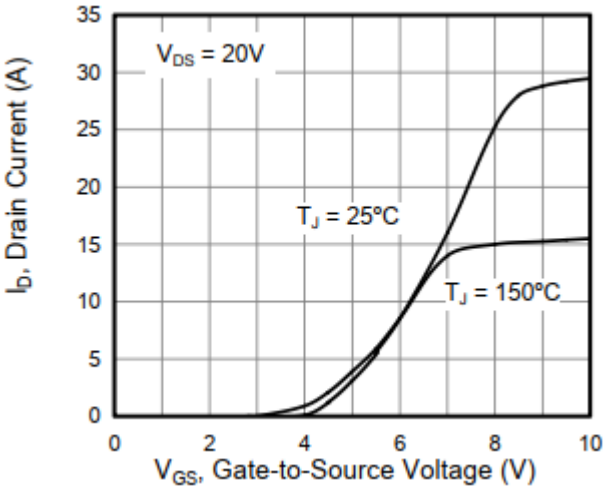


Figure 2. Transfer Characteristics

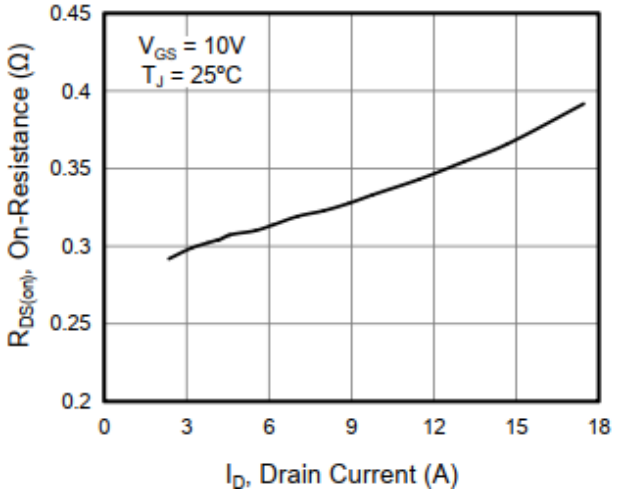


Figure 3. On-Resistance vs. Drain Current

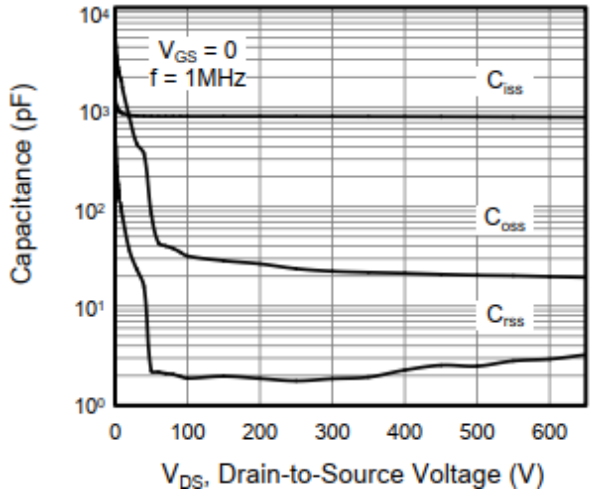


Figure 4. Capacitance

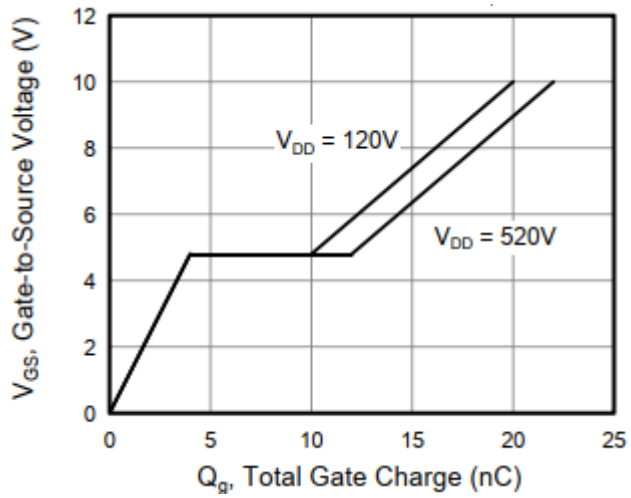


Figure 5. Gate Charge

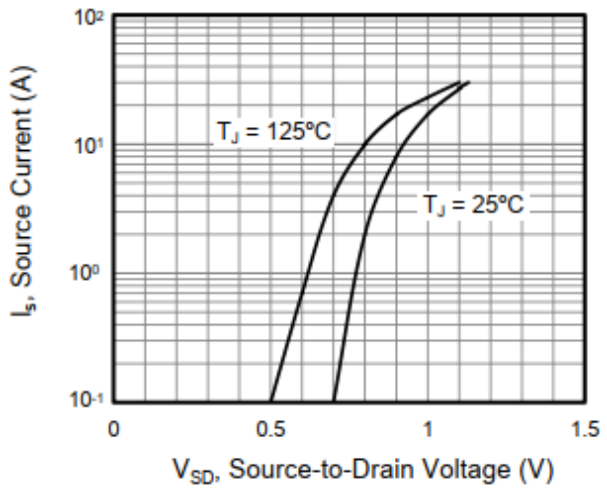


Figure 6. Body Diode Forward Voltage

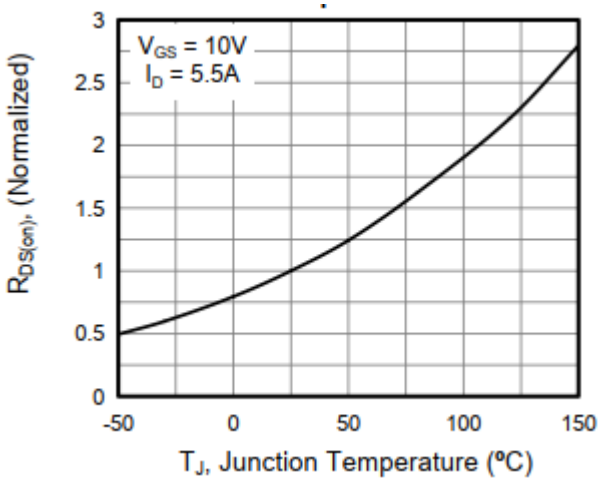


Figure 7. On-Resistance vs. Temperature

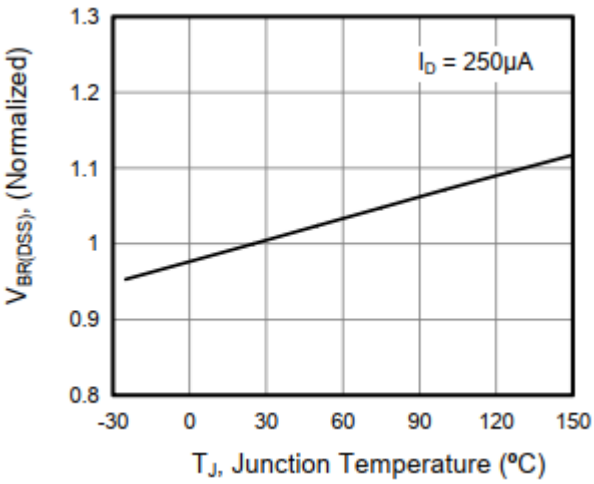


Figure8. Breakdown voltage vs. Junction Temperature

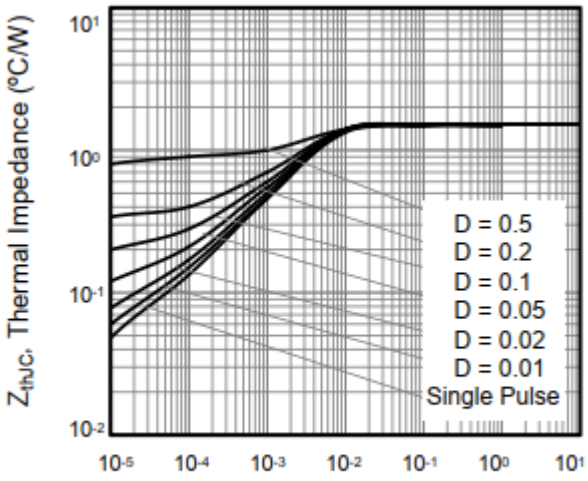


Figure 9. Transient Thermal Impedance

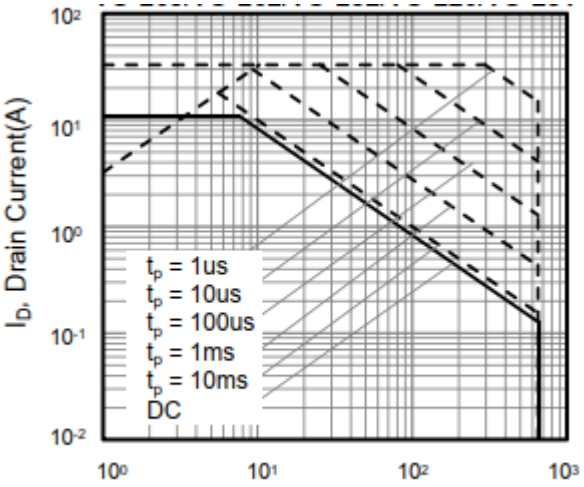


Figure 10. Safe Operation Area

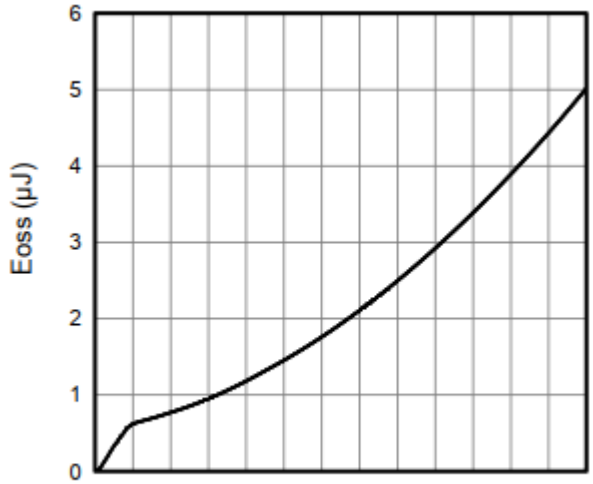
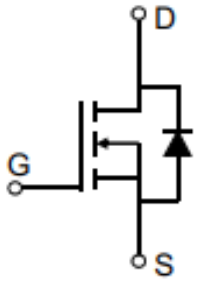
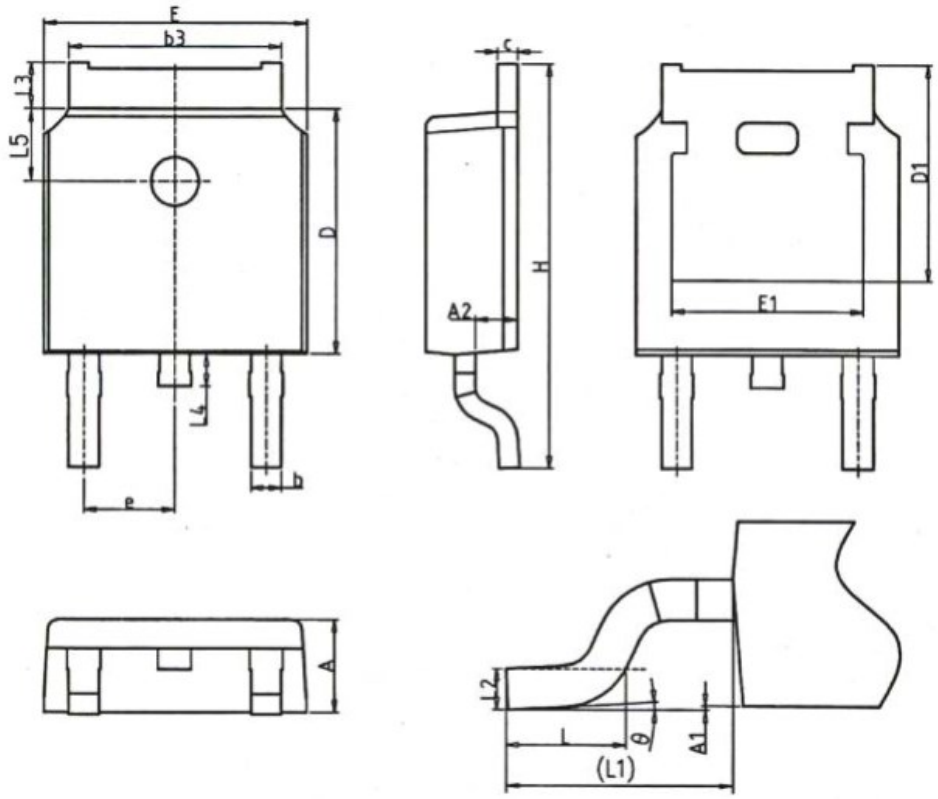


Figure 11. Typ. Coss Stored Energy

• Circuit diagram



• Package outlines : Dimensions in (mm)



Unit:mm			
Symbol	**Min.**	**Nom**	**Max.**
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	546
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30 REF		
E	6.40	6.60	6.73
E1	4.63	-	-

Unit:mm			
Symbol	**Min.**	**Nom**	**Max.**
e	2.286 BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90 REF		
L2	0.51 BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
L5	1.65	1.80	1.95
θ	0°	-	8°

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