MOSPEC

20N650D

650V N-Channel Power MOSFET

DESCRIPTION：

- Fast Switching Capability
- Extremely Low Gate Charge
- 100% UIS Tested, 100% Rg Tested
- Excellent Output Capacitance (Coss) Profile
- RoHS compliant
- Pb-Free Lead Plating

V_{DS}	650V
I_D @V_{GS}=10V	20A
$R_{DS(ON)\_Typ.}$ @V_{GS}=10V	168mΩ

TO-247-3L

TYPICAL APPLICATIONS：

- Telecom / Server Power Supplies
- Industrial Power Supplies
- Lighting / Charger / Adapter
- UPS / Solar

MAXIMUM RATINGS (at T_A = 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	20 12.1	A
Pulsed Drain Current (1)		I_{DM}	75	A
Avalanche Current (2)		I_{AS}	9	A
Avalanche Energy (2)		E_{AS}	405	mJ
Power dissipation	Tc=25℃ Tc=100℃	P_D	189 76	W
Junction & Storage temperature Range		T_J, T_{STG}	-55~+150	℃

Notes： 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. The single-pulse measurement was taken under the following condition [V_{DS}=50V, V_{GS}=10V, L=10mh] while Its value is limited by T_{JMAX} = 150℃

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Ambient Junction to Case	$R_{\theta JA}$ $R_{\theta JC}$	60 0.8	℃/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	I_{DSS}			10	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	3.5	4.5	V
Drain-Source On-State Resistance VGS = 10V, ID = 10A	$R_{DS(on)}$		168	190	mΩ
Input capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{iss}		1560		pF
Output capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{oss}		61		pF
Reverse transfer capacitance f=1MHz, VDS=100 V, VGS=0 V	C_{rss}		11.7		pF
Gate Resistance VDS=0 V, VGS= 0V, f=1MHz	R_g		8.9		Ω
Total Gate Charge VDS= 325V, ID= 10A,VGS=0 to 10V	Q_G		38		nC
Gate to Source Charge VDS= 325V, ID= 10A,VGS=0 to 10V	Q_{GS}		10.1		nC
Gate to Drain Charge VDS= 325V, ID= 10A,VGS=0 to 10V	Q_{GD}		14.8		nC
Turn-on delay time VDS=325 V, VGS= 10V, R_L=32.5Ω, R_{GEN}=6Ω	td $_{(ON)}$		17.8		ns
Rise time VDS=325 V, VGS= 10V, R_L=32.5Ω, R_{GEN}=6Ω	tr		22		ns
Turn-off delay time VDS=325 V, VGS= 10V, R_L=32.5Ω, R_{GEN}=6Ω	td $_{(OFF)}$		257		ns
Fall time VDS=325 V, VGS= 10V, R_L=32.5Ω, R_{GEN}=6Ω	tf		20		ns

Body Diode

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

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Diode Forward Voltage VGS = 0V, I_S = 1A	V_{SD}		0.75	1.0	V
Diode Continuous Current, Tc=25℃	I_S			189	A
Revers Recovery Time IF=10A, dI_F/dt = 100A/us	Trr		340		ns
Revers Recovery Charge IF=10A, dI_F/dt = 100A/us	Qrr		4.4		nC

Typical Performance Characteristics

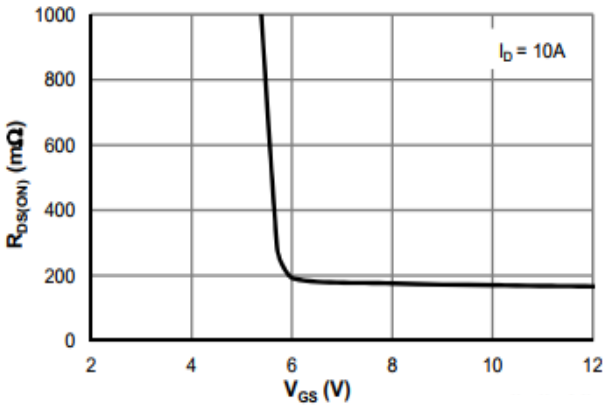


Figure 1. $R_{DS(ON)}$ vs. VGS

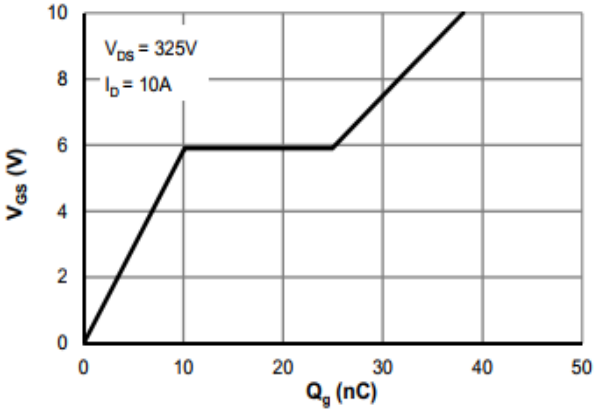


Figure 2. Gate Charge Characteristics

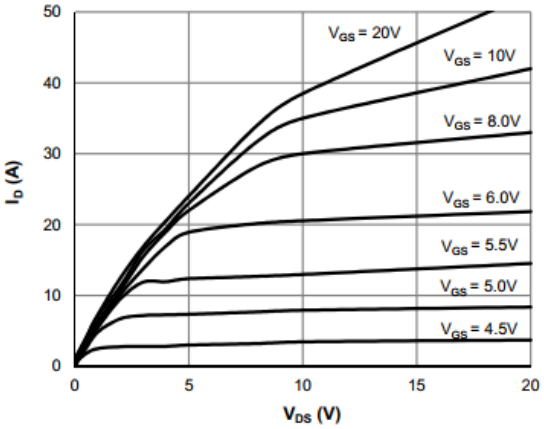


Figure 3. Saturation Characteristics

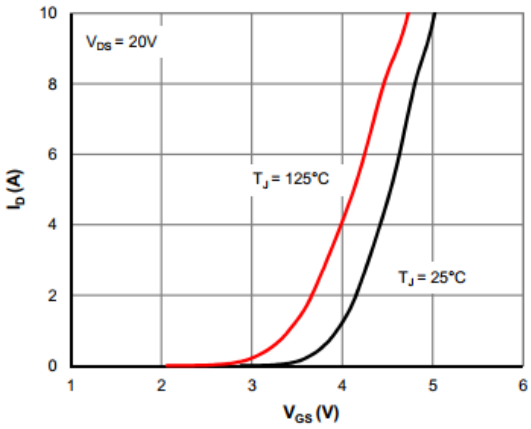


Figure 4. Transfer Characteristics

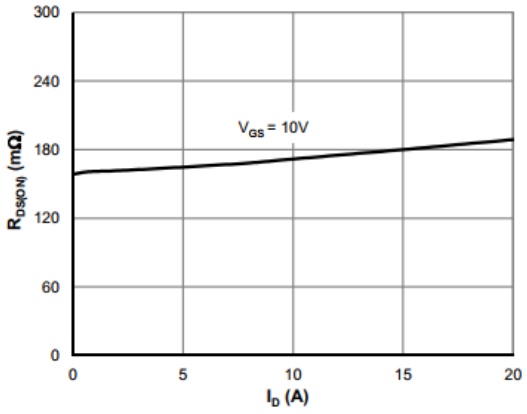


Figure 5. On-resistance vs. Drain Current

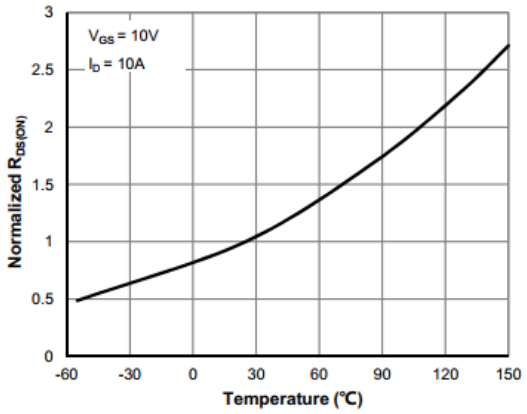


Figure 6. $R_{DS(ON)}$ vs. Junction Temperature

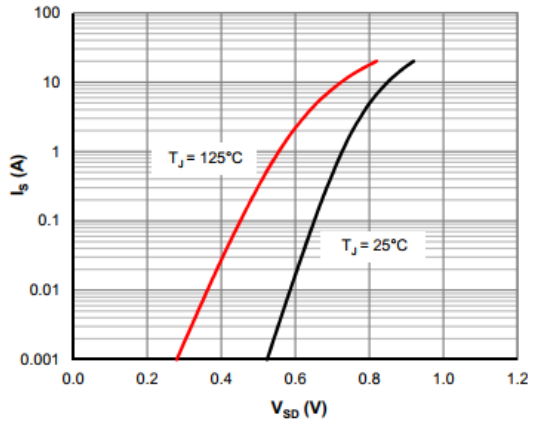


Figure 7. Body-Diode Characteristics

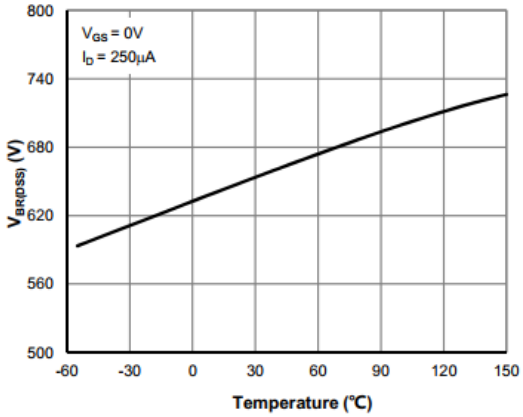


Figure 8. $V_{BR(DSS)}$ vs. Junction Temperature

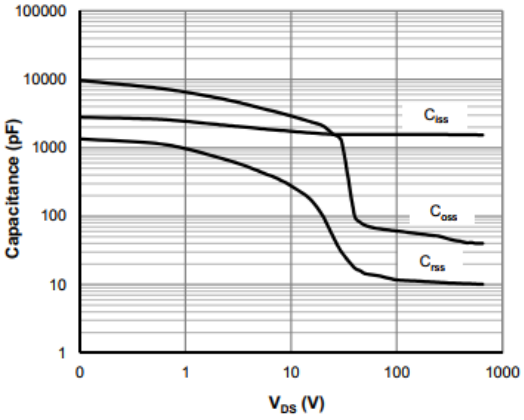


Figure 9. Capacitance Characteristics

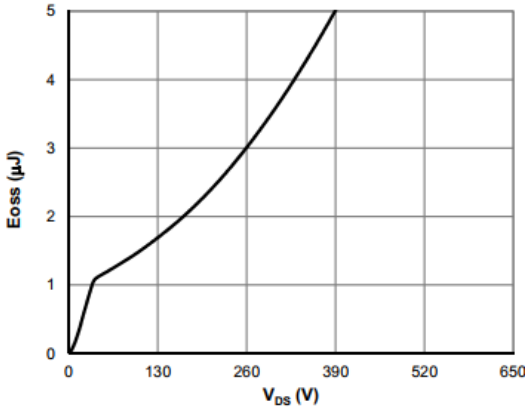


Figure 10. Coss Stored Energy

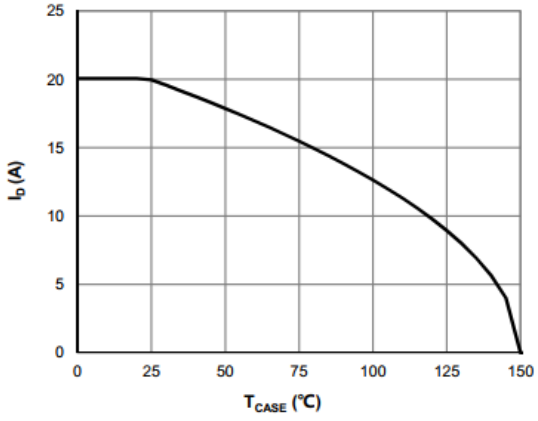


Figure 11. Current De-rating

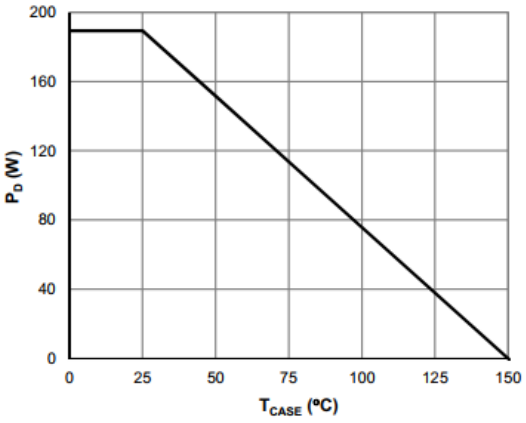


Figure 12. Power De-rating

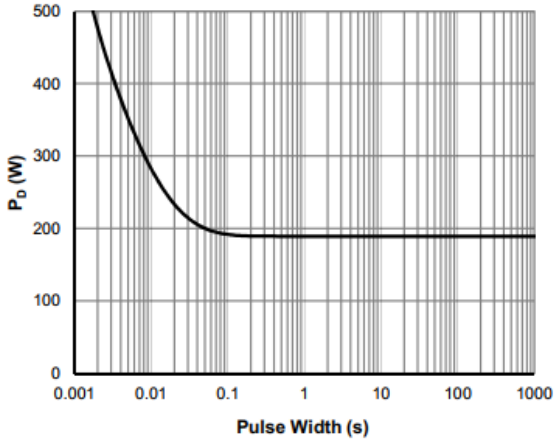


Figure 13. Single Pulse Power Rating, Junction-to-Case

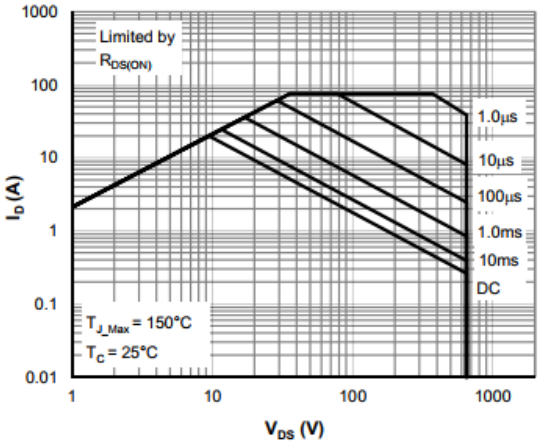


Figure 14. Maximum Safe Operating Area

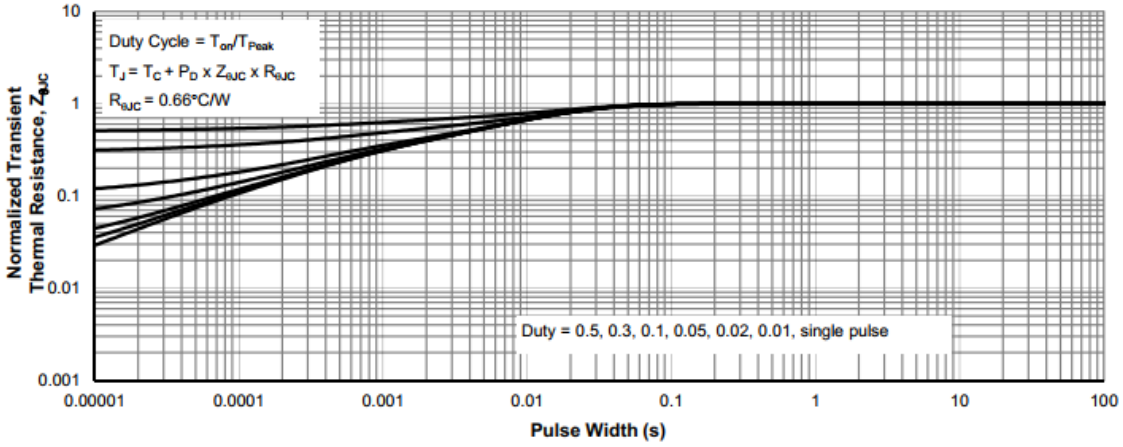
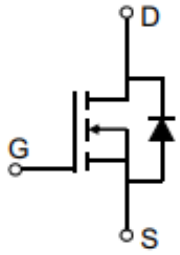
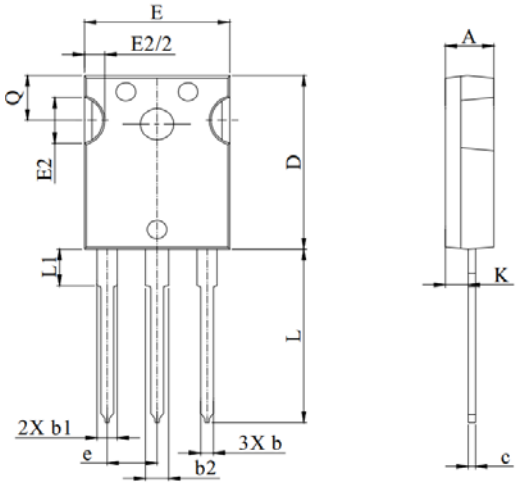


Figure 15. Normalized Maximum Transient Thermal Impedance

・Circuit diagram



・Package outlines :



Dimensions	Millimeters	
	Min	Max
A	4.80	5.21
b	1.00	1.40
b1	1.90	2.39
B2	2.87	3.22
c	0.41	0.79
D	20.80	21.20
E	15.50	16.13
E2	4.32	5.49
L	19.70	20.32
L1	4.00	4.40
K	2.20	2.50
e	5.44 BSC	

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