



Power MOSFETS

DATASHEET

LM20B50CGF6A

N-Channel AND P-Channel
Enhancement Mode MOSFET

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Quality Management Systems

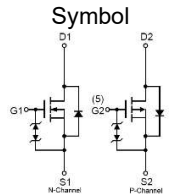
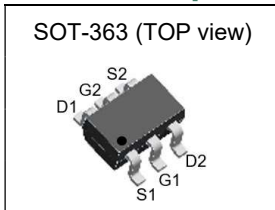
ISO 9001:2015 Certificate

LM20B50CGF6A



N-Channel AND P-Channel Enhancement Mode MOSFET

Pin Description



Ordering Information

Symbol	N-Channel	P-Channel	Unit
V_{DSS}	20	-20	V
$R_{DS(ON)-max}$	300	600	mΩ
I_D	0.72	-0.53	A

Feature

- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- ESD Protection

Applications

- Power Supply Converter Circuits
- Load/Power Switches

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM20B50CGF6A	SOT-363	Reel	3000 / Reel	3□□□

Note : □□□ = Lot Code

Absolute Maximum Ratings (T_J=25°C Unless Otherwise Noted)

Symbol	Parameter	N-Channel	P-Channel	Unit
V_{DSS}	Drain-Source Voltage	20	-20	V
V_{GSS}	Gate-Source Voltage	±12	±12	
T_J	Maximum Junction Temperature	150	150	°C
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	°C
$I_{DM}^{①}$	Pulse Drain Current Tested	T _A =25°C 0.9	-0.9	A
I_D	Continuous Drain Current	T _A =25°C 0.72	-0.53	A
		T _A =70°C 0.57	-0.42	
P_D	Maximum Power Dissipation	T _A =25°C 0.25		W
		T _A =70°C 0.16		

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	Steady State 500	°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 1in² FR-4 board with 1oz.

LM20B50CGF6A



N-Channel 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 _{DS} =250uA	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V _{DS} =16V, V _{GS} =0V	-	-	1	uA
V_{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250uA	0.5	0.75	1	V
I_{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V	-	-	±10	uA
R_{DS(ON)} ^④	Drain-Source On-state Resistance	V _{GS} =4.5V, I _{DS} =0.6A	-	245	300	mΩ
		V _{GS} =2.5V, I _{DS} =0.4A	-	310	400	
		V _{GS} =1.8V, I _{DS} =0.35A	-	420	580	
gfs	Forward Transconductance	V _{DS} =3V, I _{DS} =0.3A	-	0.9	-	S
Dynamic Characteristics ^⑤						
C_{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =10V, Freq.=1MHz	-	40	-	pF
C_{oss}	Output Capacitance		-	17	-	
C_{rss}	Reverse Transfer Capacitance		-	9.9	-	
td(ON)	Turn-on Delay Time	V _{GS} =4.5V, V _{DS} =10V, I _D =2A, R _{GEN} =6Ω	-	1.2	-	nS
t_r	Turn-on Rise Time		-	24.5	-	
t_{d(OFF)}	Turn-off Delay Time		-	13.6	-	
t_f	Turn-off Fall Time		-	14.6	-	
Q_g	Total Gate Charge	V _{GS} =2.5V, V _{DS} =10V I _D =1A	-	0.54	-	nC
Q_g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =1A	-	1	-	
Q_{gs}	Gate-Source Charge		-	0.3	-	
Q_{gd}	Gate-Drain Charge		-	0.1	-	
Source-Drain Characteristics						
V_{SD} ^④	Diode Forward Voltage	I _{SD} =0.3A, V _{GS} =0V	-	0.75	1.1	V
t_{rr}	Reverse Recovery Time	I _F =1A, V _R =10V	-	9.2	-	nS
Q_{rr}	Reverse Recovery Charge	dI _F /dt=100A/μs	-	0.82	-	nC

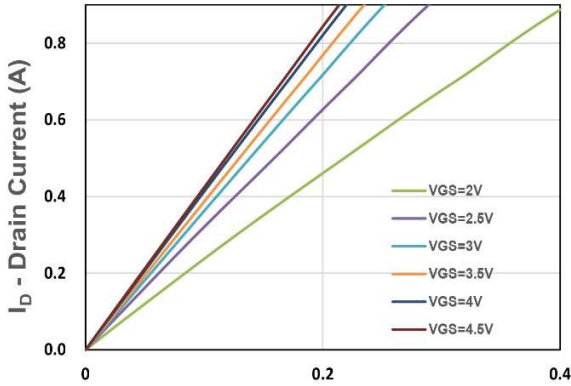
Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

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

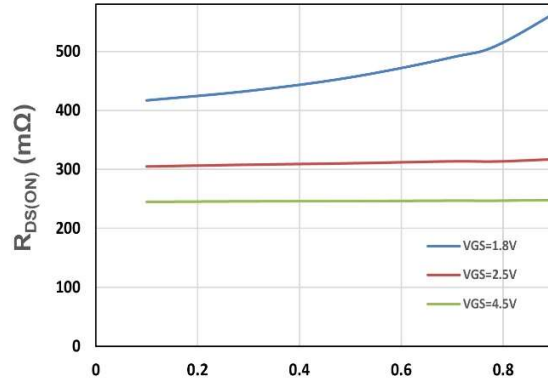
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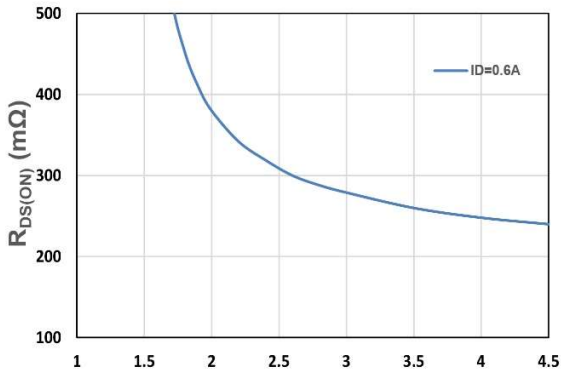
N-Channel Typical Characteristics



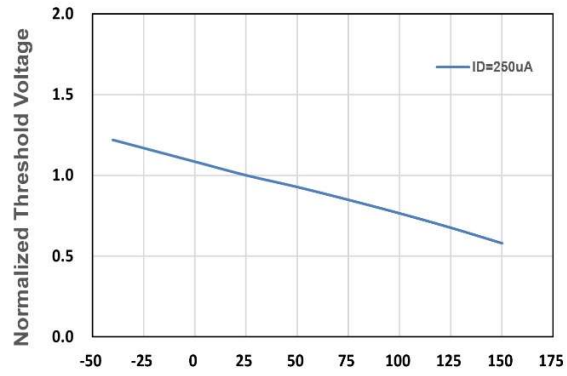
V_{DS} - Drain - Source Voltage (V)
Figure 1. Output Characteristics



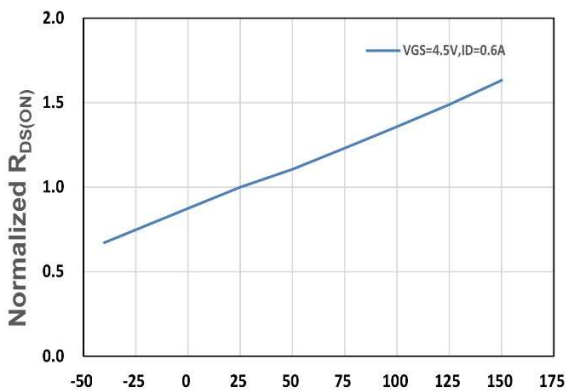
I_D - Drain Current (A)
Figure 2. On-Resistance vs. ID



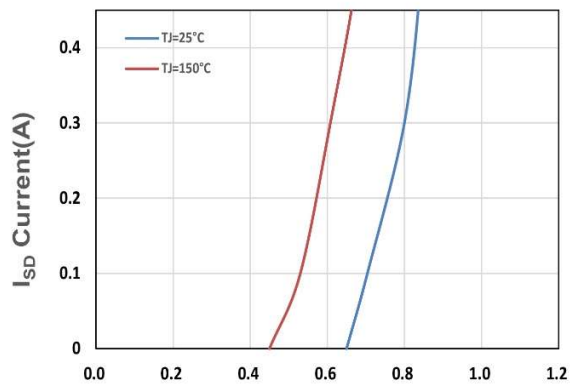
V_{GS} - Gate - Source Voltage (V)
Figure 3. On-Resistance vs. VGS



T_j , Junction Temperature($^{\circ}C$)
Figure 4. Gate Threshold Voltage

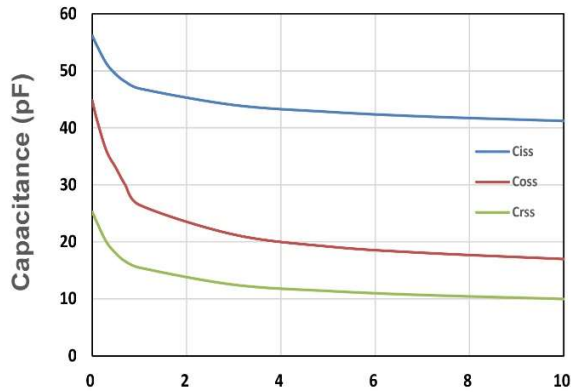


T_j , Junction Temperature($^{\circ}C$)
Figure 5. Drain-Source On Resistance

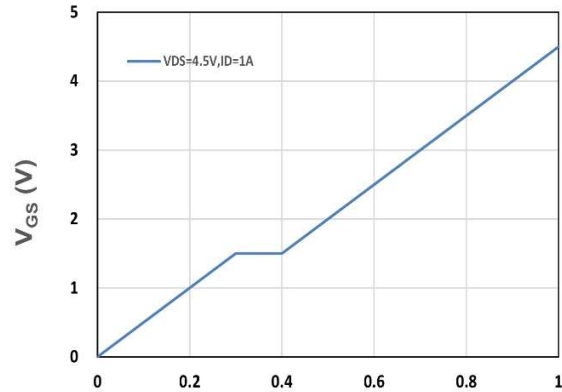


V_{SD} , Source-Drain Voltage(V)
Figure 6. Source-Drain Diode Forward

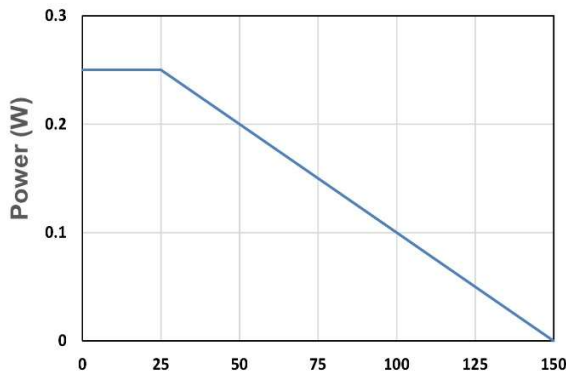
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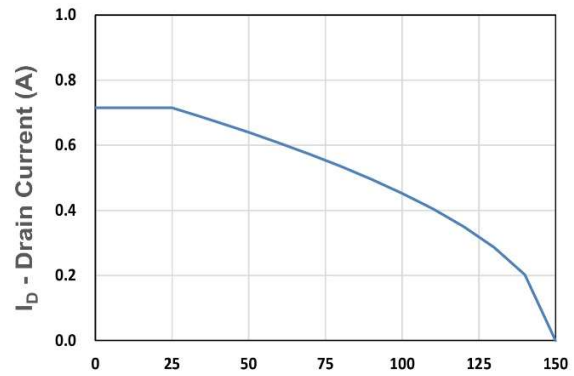
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



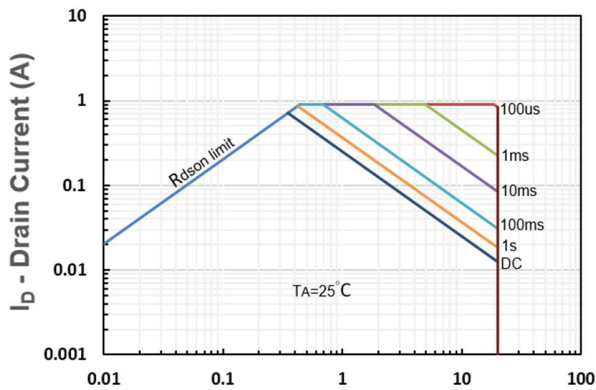
Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



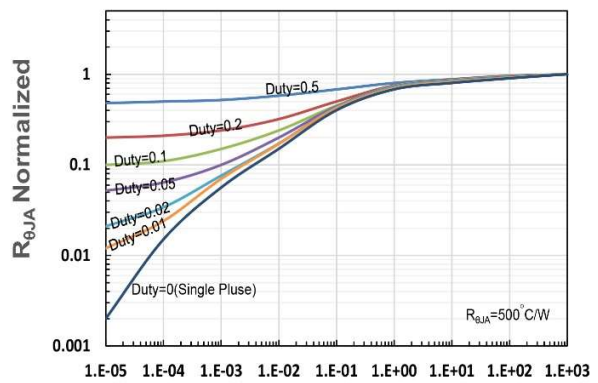
T_A - Ambient Temperature (°C)
Figure 9. Power Dissipation



T_A - Ambient Temperature (°C)
Figure 10. Drain Current



V_{DS} - Drain-Source Voltage (V)
Figure 11. Safe Operating Area



t_1 , Square Wave Pulse Duration(s)
Figure 12. $R_{\theta JA}$ Transient Thermal Impedance

P-Channel 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 _{DS} =-250uA	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-16 V _{GS} =0V	-	-	-1	uA
V_{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250uA	-0.5	-0.75	-1	V
I_{GSS}	Gate Leakage Current	V _{GS} =±12 V _{DS} =0V	-	-	±10	uA
R_{DS(ON)} [®]	Drain-Source On-state Resistance	V _{GS} =-4.5V, I _{DS} =-0.43A	-	500	600	mΩ
		V _{GS} =-2.5V, I _{DS} =-0.3A	-	680	900	
		V _{GS} =-1.8V, I _{DS} =-0.01A	-	800	1200	
gfs	Forward Transconductance	V _{DS} =-3V, I _{DS} =-0.22A	-	0.85	-	S
Dynamic Characteristics [®]						
C_{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-10V, Freq.=1MHz	-	57.8	-	pF
C_{oss}	Output Capacitance		-	5.6	-	
C_{rss}	Reverse Transfer Capacitance		-	4.3	-	
td(ON)	Turn-on Delay Time	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-1A, R _{GEN} =6Ω	-	0.4	-	nS
t_r	Turn-on Rise Time		-	0.03	-	
t_{d(OFF)}	Turn-off Delay Time		-	0.04	-	
t_f	Turn-off Fall Time		-	1.1	-	
Q_g	Total Gate Charge	V _{GS} =-2.5V, V _{DS} =-10V I _D =-0.43A	-	0.6	-	nC
Q_g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-0.43A	-	1	-	
Q_{gs}	Gate-Source Charge		-	0.17	-	
Q_{gd}	Gate-Drain Charge		-	0.18	-	
Source-Drain Characteristics						
V_{SD} [®]	Diode Forward Voltage	I _{SD} =-0.22A, V _{GS} =0V	-	-0.8	-1.1	V
t_{rr}	Reverse Recovery Time	I _F =-0.22A, V _R =-10V	-	60	-	nS
Q_{rr}	Reverse Recovery Charge	di _F /dt=100A/μs	-	50	-	nC

P-Channel Typical Characteristics

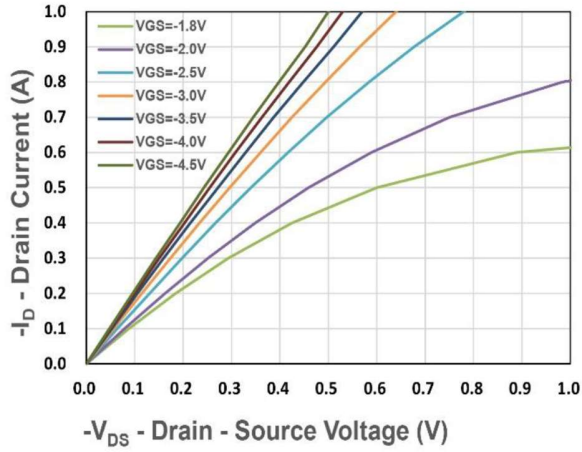


Figure 1. Output Characteristics

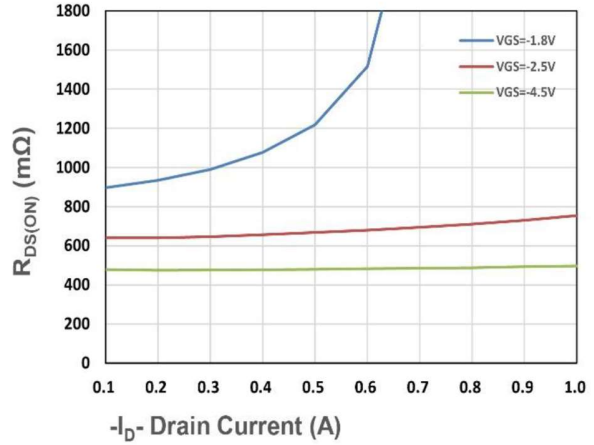


Figure 2. On-Resistance vs. I_D

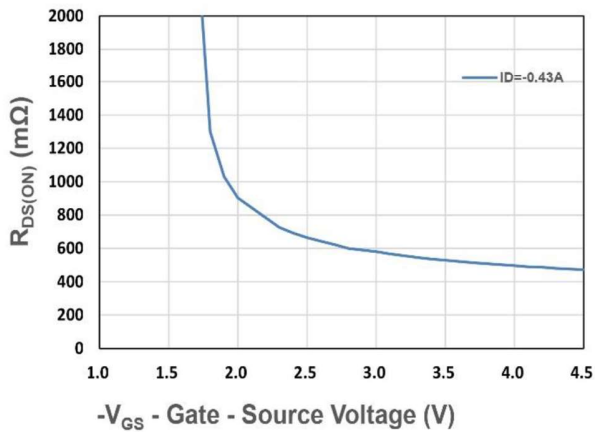


Figure 3. On-Resistance vs. V_{GS}

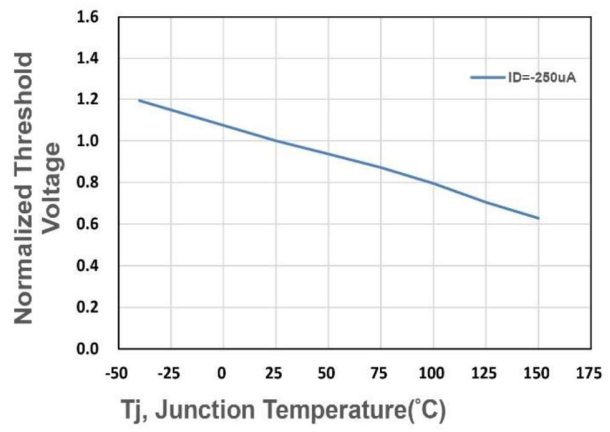


Figure 4. Gate Threshold Voltage

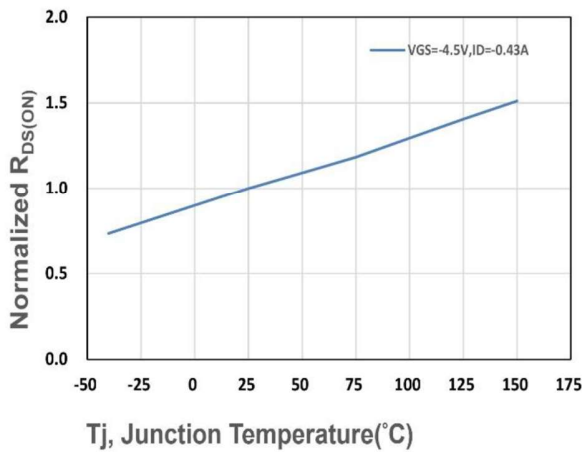


Figure 5. Drain-Source On Resistance

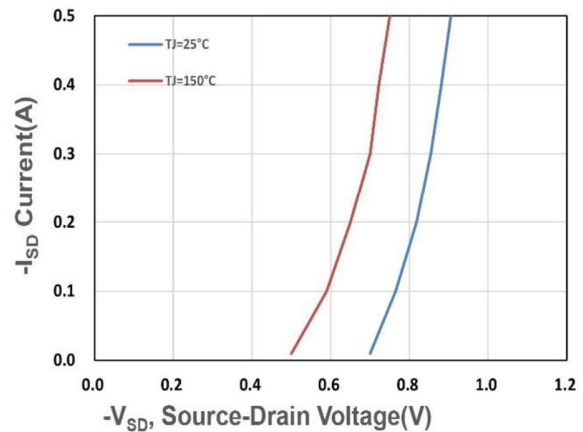
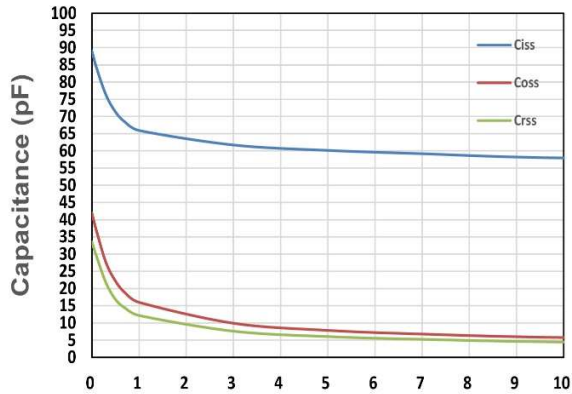
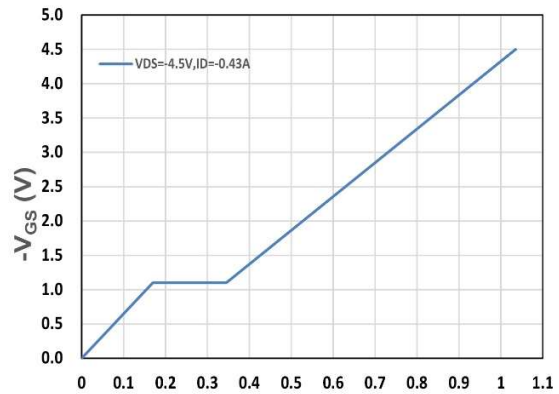


Figure 6. Source-Drain Diode Forward

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$-V_{DS}$ - Drain - Source Voltage (V)
Figure 7. Capacitance



Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics

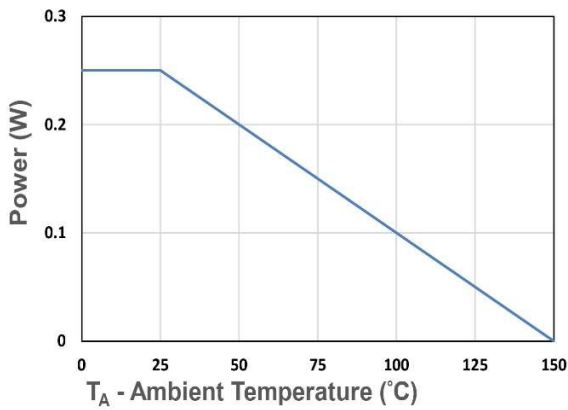


Figure 9. Power Dissipation

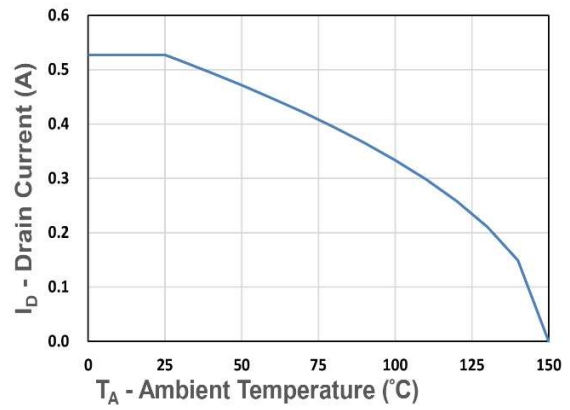


Figure 10. Drain Current

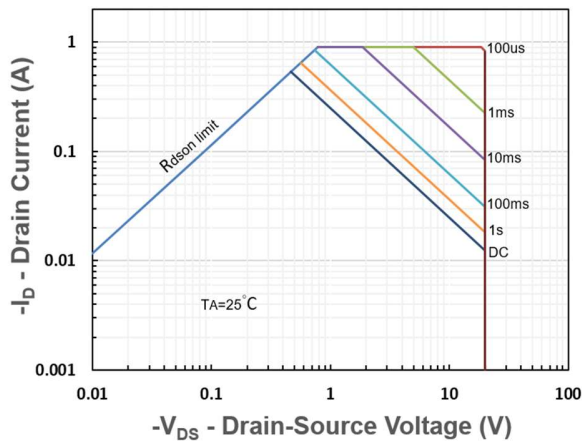


Figure 11. Safe Operating Area

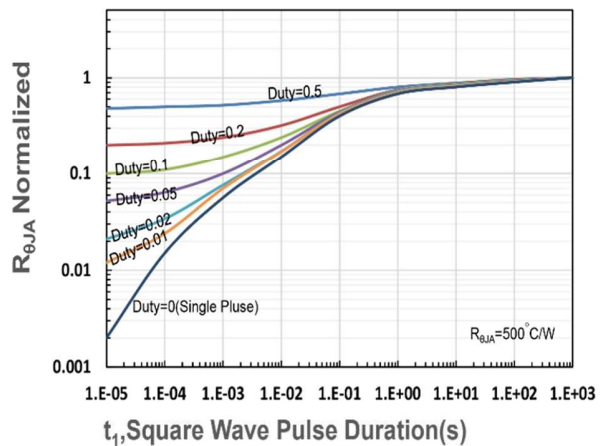


Figure 12. $R_{\theta JA}$ Transient Thermal Impedance