Power MOSFETS

DATASHEET

LM20B50CGE6A

N-Channel AND P-Channel
Enhancement Mode MOSFET

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Quality Management Systems

ISO 9001:2015 Certificate

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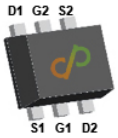
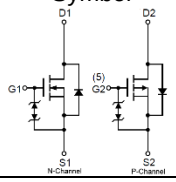
N-Channel AND P-Channel Enhancement Mode MOSFET

Pin Description

SOT-563 (TOP view)



Symbol



Odering Information

Symbol	N-Channel	P-Channel	Unit
V_{DSS}	**20**	**-20**	**V**
$R_{DS(ON)}$	**250**	**580**	**mΩ**
I_D	**1**	**-0.69**	**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
LM20B50CGE6A	SOT-563	Tape & Reel	3000 / Tape & Reel	3□□□

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	1	-1	A
I_D	Continuous Drain Current	T_A=25°C	1①	-0.69	A
		T_A=70°C	0.84	-0.6	
P_D	Maximum Power Dissipation	T_A=25°C	0.42		W
		T_A=70°C	0.27		

Thermal Characteristics

Symbol	Parameter		Rating	Unit
$R_{\theta JA}$③	Thermal Resistance-Junction to Ambient	Steady State	300	°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.

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	-	220	250	mΩ
		V_{GS}=2.5V, I_{DS}=0.4A	-	280	365	
		V_{GS}=1.8V, I_{DS}=0.35A	-	390	585	
gfs	Forward Transconductance	V_{DS}=3V, I_{DS}=0.3A	-	1.3	-	S
Dynamic Characteristics ⑤						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, Freq.=1MHz	-	40	-	pF
C_{oss}	Output Capacitance		-	16.5	-	
C_{rss}	Reverse Transfer Capacitance		-	10.1	-	
$td_{(ON)}$	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		-	24.6	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	13.5	-	
t_f	Turn-off Fall Time		-	14.6	-	
Q_g	Total Gate Charge	V_{GS}=2.5V,V_{DS}=10V I_D=0.6A	-	0.55	-	nC
Q_g	Total Gate Charge	V_{GS}=4.5V,V_{DS}=10V, I_D=0.6A	-	1	-	
Qgs	Gate-Source Charge		-	0.31	-	
Qgd	Gate-Drain Charge		-	0.11	-	
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=0.3A, V_R=10V dI$_F$/dt=100A/μs	-	9	-	nS
Q_{rr}	Reverse Recovery Charge		-	0.78	-	nC

Note ④：Pulse test (pulse width≤300us, duty cycle≤2%).
Note ⑤：Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

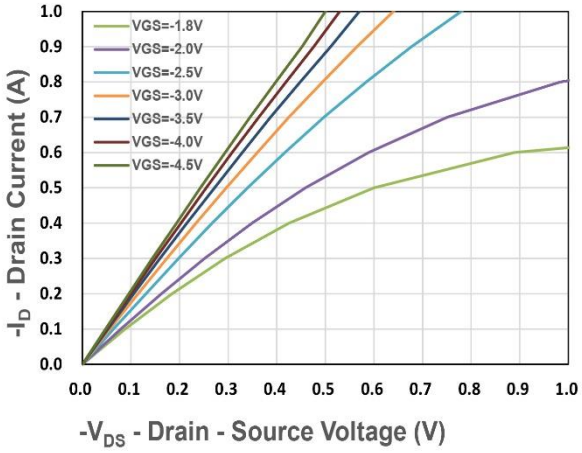


Figure 1. Output Characteristics

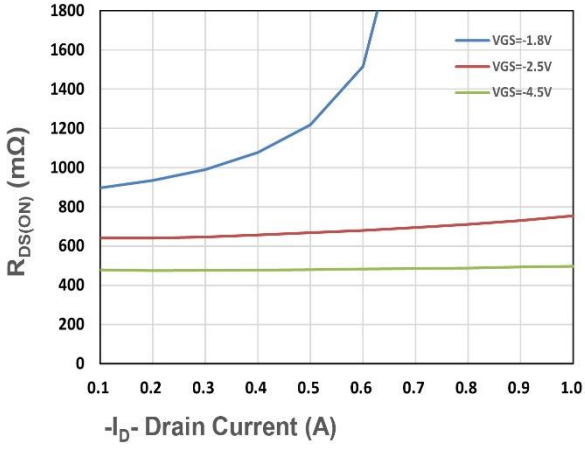


Figure 2. On-Resistance vs. ID

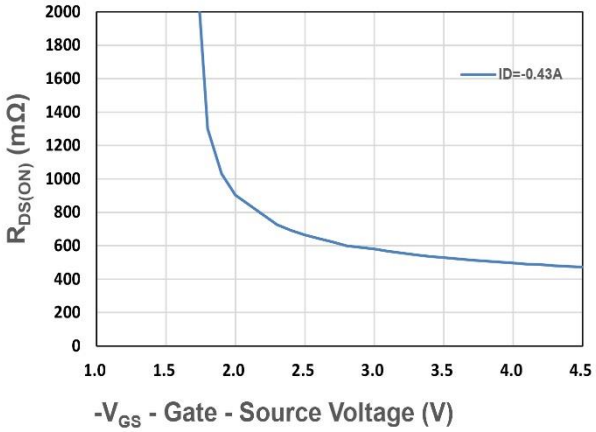


Figure 3. On-Resistance vs. VGS

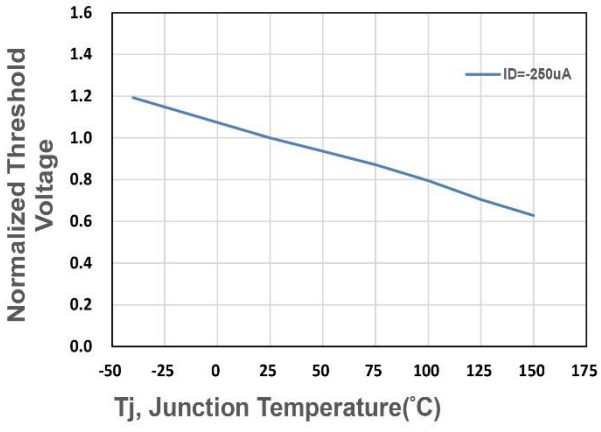


Figure 4. Gate Threshold Voltage

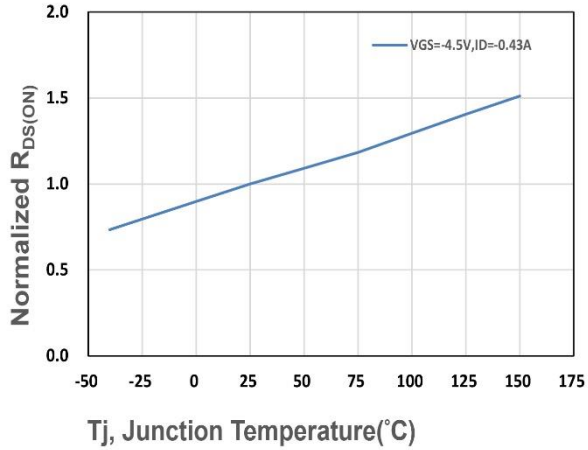


Figure 5. Drain-Source On Resistance

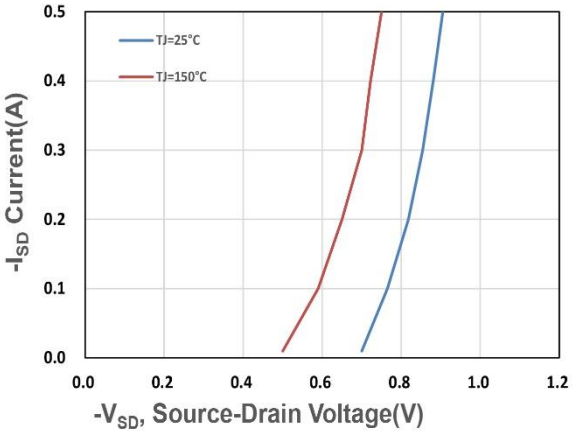
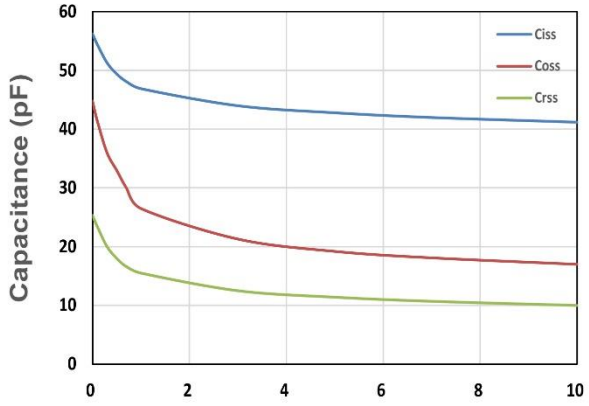
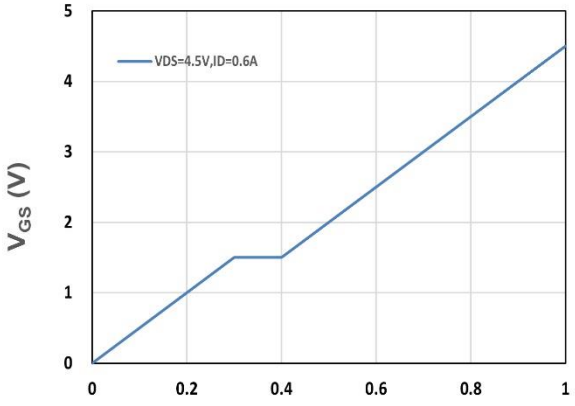


Figure 6. Source-Drain Diode Forward



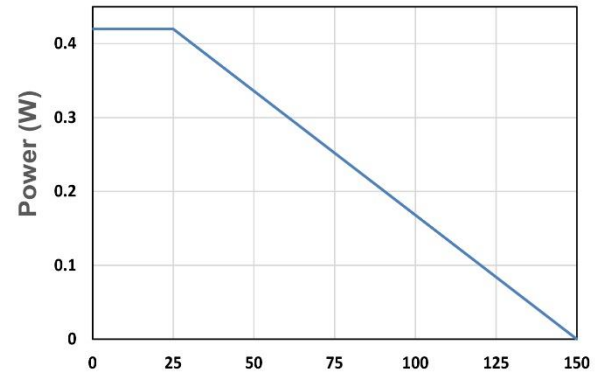
V_{DS} - Drain - Source Voltage (V)

Figure 7. Capacitance



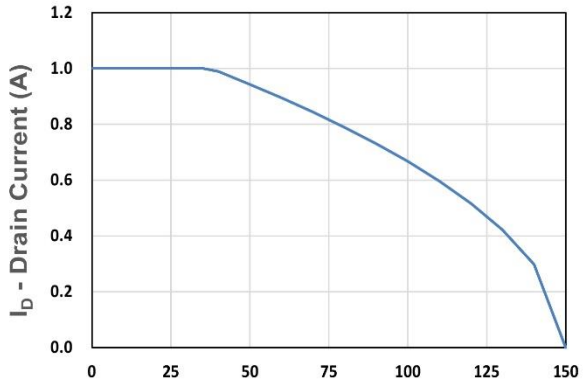
Qg, Total Gate Charge (nC)

Figure 8. Gate Charge Characteristics



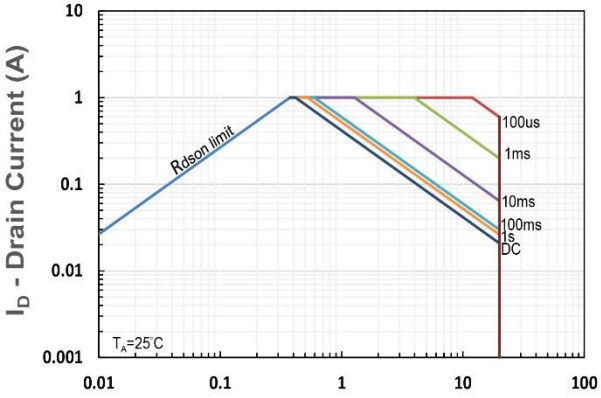
T_A - Junction Temperature (°C)

Figure 9. Power Dissipation



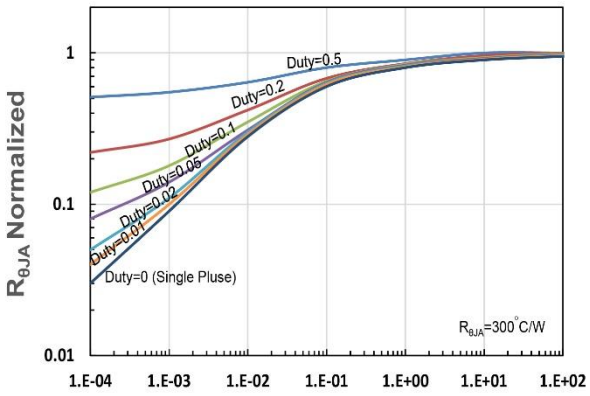
T_A - Junction Temperature (°C)

Figure 10. Drain Current



V_{DS} - Drain-Source Voltage (V)

Figure 11. Safe Operating Area



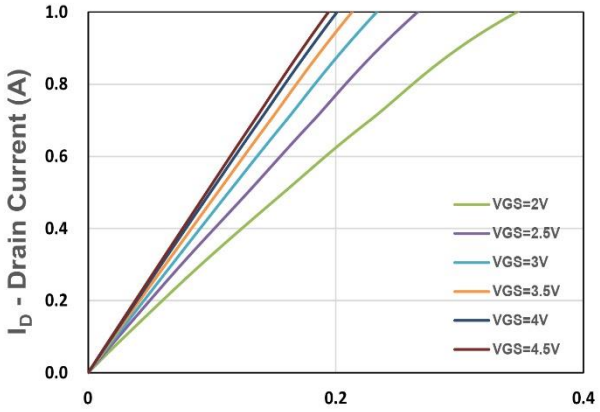
t_1,Square Wave Pulse Duration(s)

Figure 12. RθJA Transient Thermal Impedance

P-Channel Electrical Characteristics (T_J=25°C Unless Otherwise Noted)

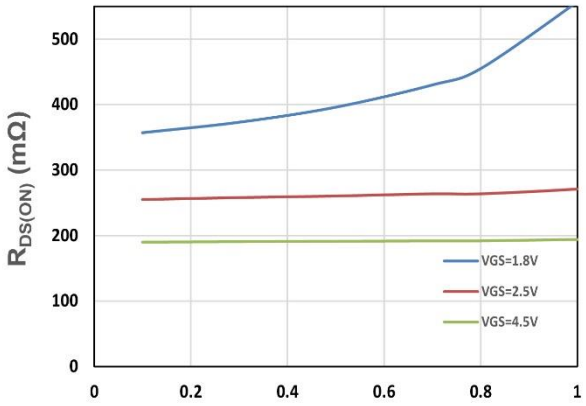
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=-250uA	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-16 V_{GS}=0V	-	-	-1	uA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250uA	-0.5	-0.75	-1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±12 V_{DS}=0V	-	-	±10	uA
$R_{DS(ON)}$④	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 ⑤						
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	-	
Qgs	Gate-Source Charge		-	0.17	-	
Qgd	Gate-Drain Charge		-	0.18	-	
Source-Drain Characteristics						
V_{SD}④	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 dI$_F$/dt=100A/μs	-	60	-	nS
Q_{rr}	Reverse Recovery Charge		-	50	-	nC

P-Channel Typical Characteristics



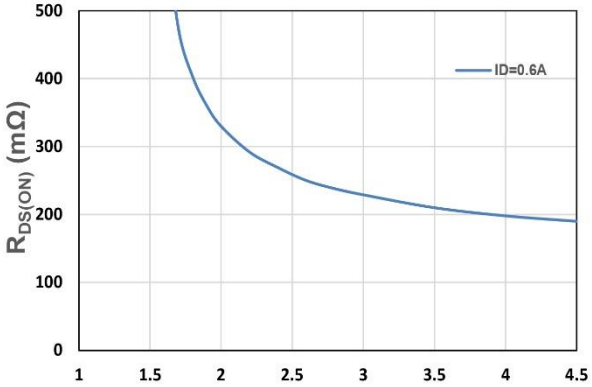
V_{DS} - Drain - Source Voltage (V)

Figure 1. Output Characteristics



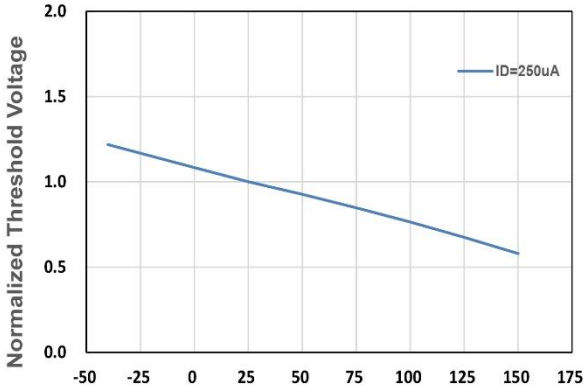
I_D- Drain Current (A)

Figure 2. On-Resistance vs. ID



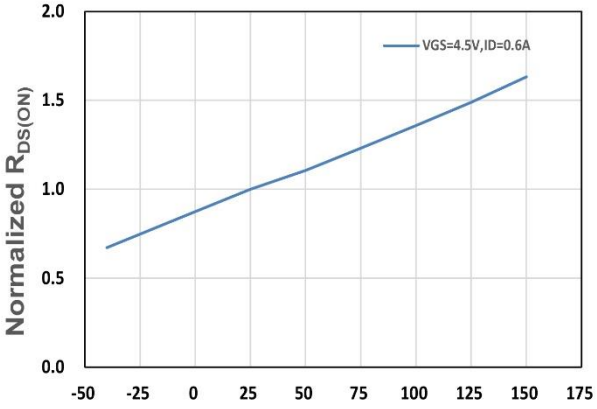
V_{GS} - Gate - Source Voltage (V)

Figure 3. On-Resistance vs. VGS



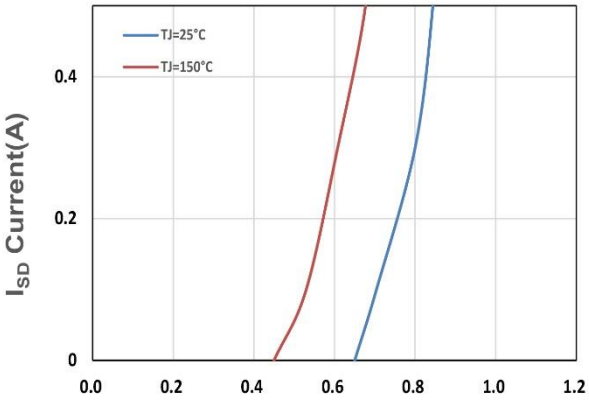
Tj, Junction Temperature(˚C)

Figure 4. Gate Threshold Voltage



Tj , Junction Temperature(˚C)

Figure 5. Drain-Source On Resistance



V_{SD}, Source-Drain Voltage(V)

Figure 6. Source-Drain Diode Forward

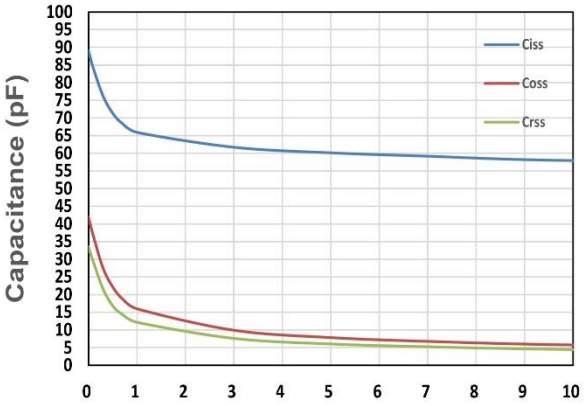


Figure 7. Capacitance

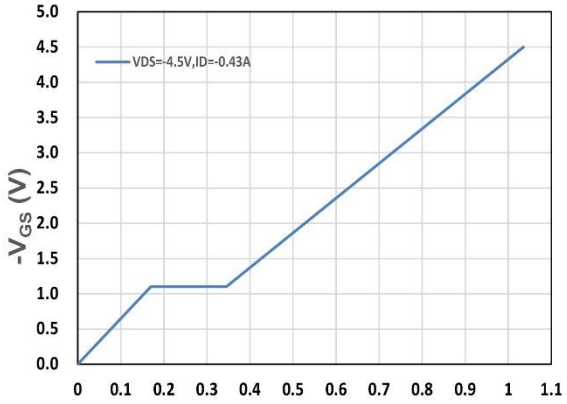


Figure 8. Gate Charge Characteristics

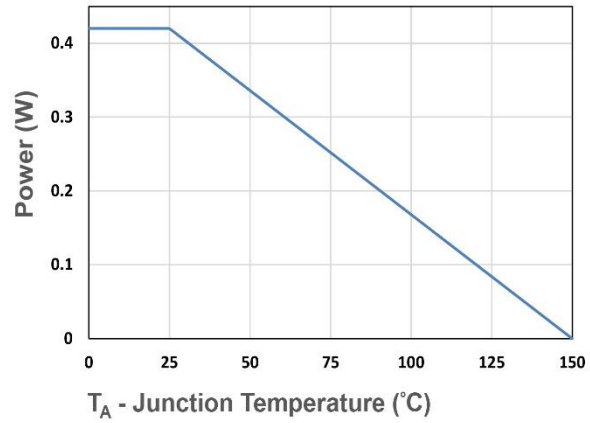


Figure 9. Power Dissipation

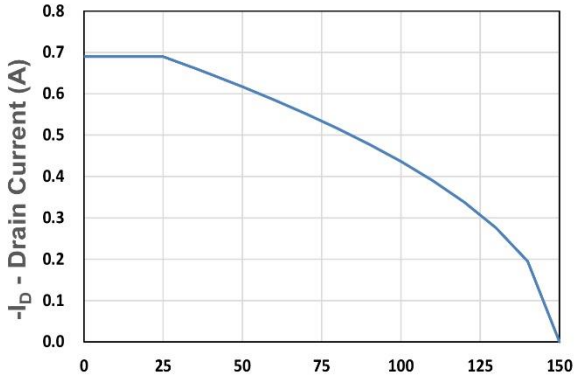


Figure 10. Drain Current

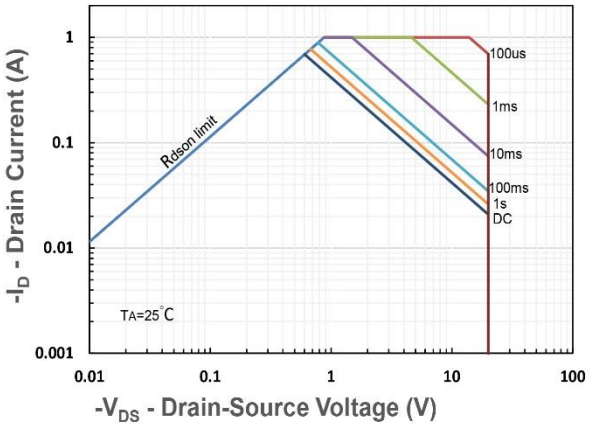


Figure 11. Safe Operating Area

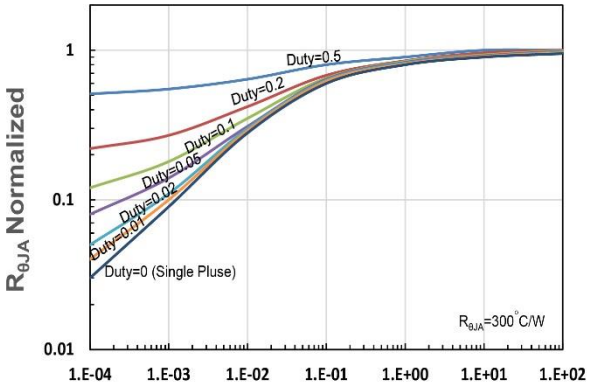


Figure 12. RθJA Transient Thermal Impedance