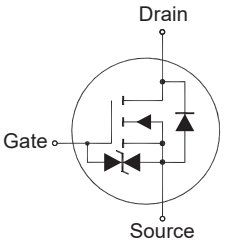
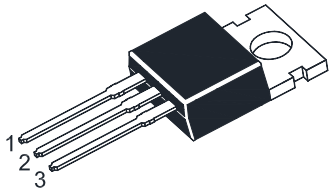
SWDCTE6N055LK-CH

N-Channel Enhancement Mode MOSFET

Features

- Low $R_{DS(ON)}$
- AEC-Q101 Qualified
- Halogen and Antimony Free(HAF), RoHS compliant
- Built-in G-S Protection Diode
- Typical ESD Protection HBM Class 2





1.Gate 2.Drain 3.Source
TO-220FB Plastic Package

Classification	Voltage Range(V)
0A	< 125
0B	125 to < 250
1A	250 to < 500
1B	500 to < 1000
1C	1000 to < 2000
2	2000 to < 4000
3A	4000 to < 8000
3B	≥ 8000

Key Parameters

Parameter	Value	Unit
BV_{DSS}	65	V
$R_{DS(ON)}$ Max	6.1 @ V_{GS} = 10 V	mΩ
	10.5 @ V_{GS} = 4.5 V	
$V_{GS(th)}$ typ	1.7	V
Q_g typ	31 @ V_{GS} = 10 V	nC

Application

- Motor/Body Load Control
- High Frequency Switching and Synchronous Rectification

Absolute Maximum Ratings (at T_a = 25℃ unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	65	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	T_c = 25℃ T_c = 100℃	I_D	90 56.7	A
Peak Drain Current, Pulsed [1]		I_{DM}	360	A
Avalanche Current		I_{AS}	9.1	A
Single Pulse Avalanche Energy [2]		E_{AS}	4.1	mJ
Total Power Dissipation	T_c = 25℃	P_{tot}	83.3	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to + 150	℃

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.5	℃/W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	50	℃/W

[1] Pulse Test: Pulse Width ≤ 100 μs, Duty Cycle ≤ 2%, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$ = 150°C.

[2] Limited by $T_{J(MAX)}$, starting T_J = 25 °C, L = 0.1 mH, R_g = 25 Ω, I_{AS} = 9.1 A, V_{GS} = 10 V.

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Characteristics at T_a = 25℃ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at I_D = 1 mA	BV_{DSS}	65	-	-	V
Drain-Source Leakage Current at V_{DS} = 65 V	I_{DSS}	-	-	1	μA
Gate Leakage Current at V_{GS} = ± 20 V	I_{GSS}	-	-	± 10	μA
Gate-Source Threshold Voltage at V_{DS} = V_{GS}, I_D = 250 μA	$V_{GS(th)}$	1.2	-	2.5	V
Drain-Source On-State Resistance at V_{GS} = 10 V, I_D = 20 A at V_{GS} = 4.5 V, I_D = 10 A	$R_{DS(on)}$	- -	5.3 -	6.1 10.5	mΩ
DYNAMIC PARAMETERS					
Forward Transconductance at V_{DS} = 5 V, I_D = 20 A	g_{fs}	-	37	-	S
Gate resistance at V_{GS} = 0 V, V_{DS} = 0 V, f = 1 MHz	R_g	-	1	-	Ω
Input Capacitance at V_{GS} = 0 V, V_{DS} = 30 V, f = 1 MHz	C_{iss}	-	1691	-	pF
Output Capacitance at V_{GS} = 0 V, V_{DS} = 30 V, f = 1 MHz	C_{oss}	-	604	-	pF
Reverse Transfer Capacitance at V_{GS} = 0 V, V_{DS} = 30 V, f = 1 MHz	C_{rss}	-	37	-	pF
Gate charge total at V_{DS} = 30 V, I_D = 20 A, V_{GS} = 10 V at V_{DS} = 30 V, I_D = 20 A, V_{GS} = 4.5 V	Q_g	- -	31 16	- -	nC
Gate to Source Charge at V_{DS} = 30 V, I_D = 20 A, V_{GS} = 10 V	Q_{gs}	-	6	-	nC
Gate to Drain Charge at V_{DS} = 30 V, I_D = 20 A, V_{GS} = 10 V	Q_{gd}	-	7.5	-	nC
Turn-On Delay Time at V_{DS} = 30 V, I_D = 20 A, V_{GS} = 10 V, R_g = 3.3 Ω	$t_{d(on)}$	-	14	-	ns
Turn-On Rise Time at V_{DS} = 30 V, I_D = 20 A, V_{GS} = 10 V, R_g = 3.3 Ω	t_r	-	25	-	ns
Turn-Off Delay Time at V_{DS} = 30 V, I_D = 20 A, V_{GS} = 10 V, R_g = 3.3 Ω	$t_{d(off)}$	-	13	-	ns
Turn-Off Fall Time at V_{DS} = 30 V, I_D = 20 A, V_{GS} = 10 V, R_g = 3.3 Ω	t_f	-	2.7	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at I_S = 1 A, V_{GS} = 0 V	V_{SD}	-	-	1.3	V
Body-Diode Continuous Current	I_S	-	-	90	A
Body-Diode Continuous Current, Pulsed	I_{SM}	-	-	360	A
Body Diode Reverse Recovery Time at I_S = 20 A, di/dt = 100 A / μs	t_{rr}	-	19	-	ns
Body Diode Reverse Recovery Charge at I_S = 20 A, di/dt = 100 A / μs	Q_{rr}	-	8	-	nC

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Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

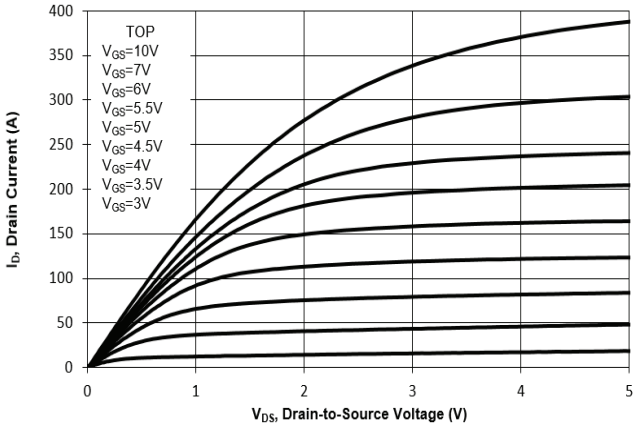


Fig. 2 Typical Transfer Characteristics

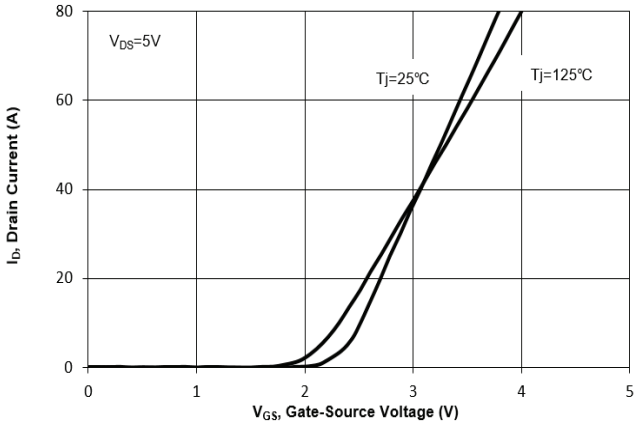


Fig. 3 On-Resistance vs. Drain Current

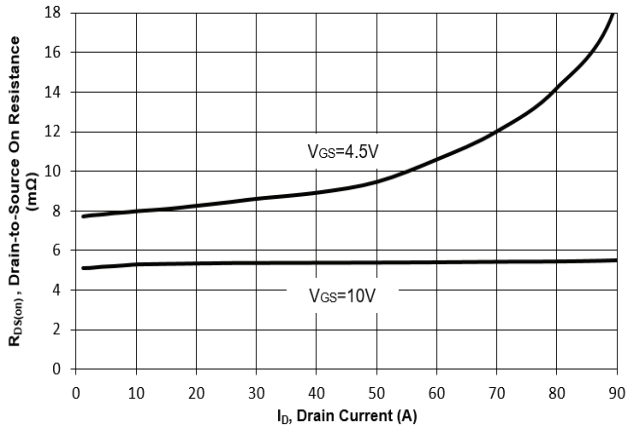


Fig. 4 On-Resistance vs. Gate to Source Voltage

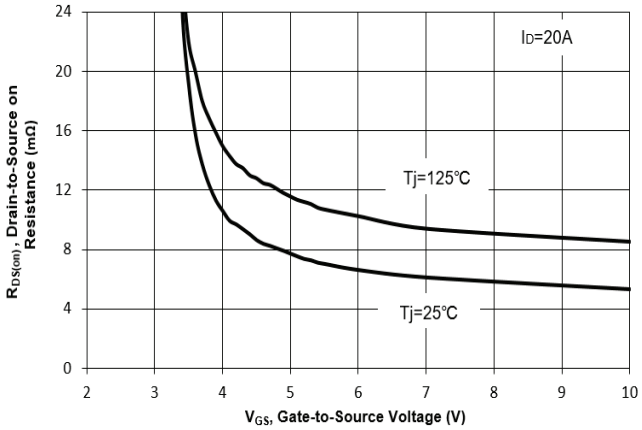


Fig. 5 On-Resistance vs.T_j

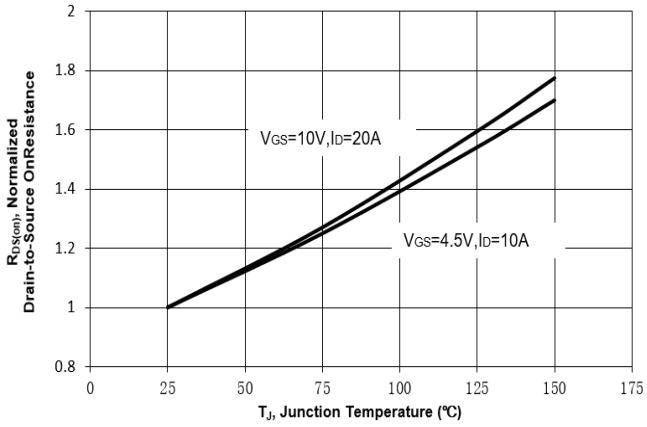
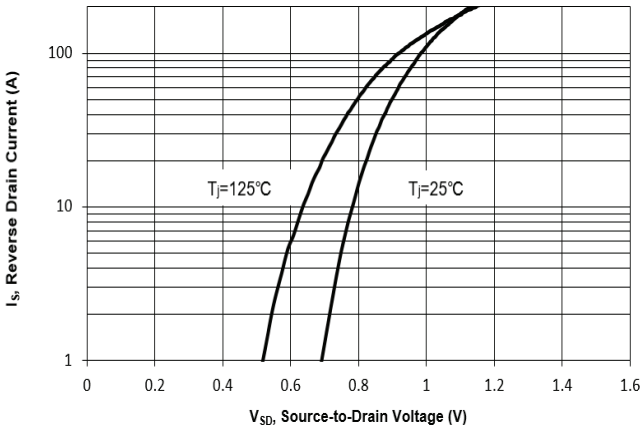


Fig. 6 Typical Body-Diode Forward Characteristics



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Electrical Characteristics Curves

Fig.13 Normalized Maximum Transient Thermal Impedance($Z_{\Theta JC}$)

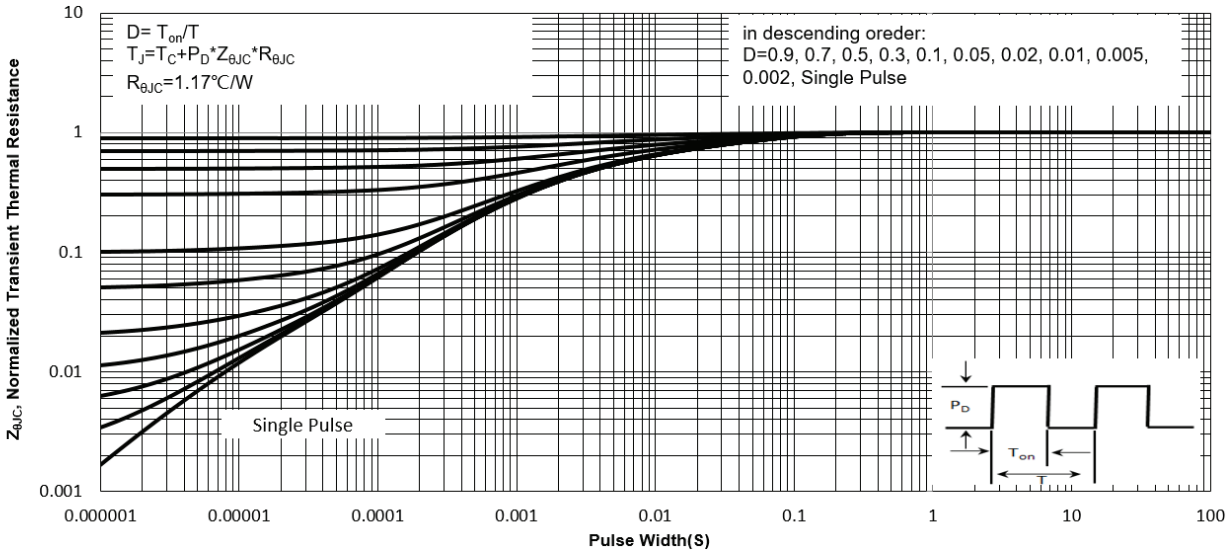
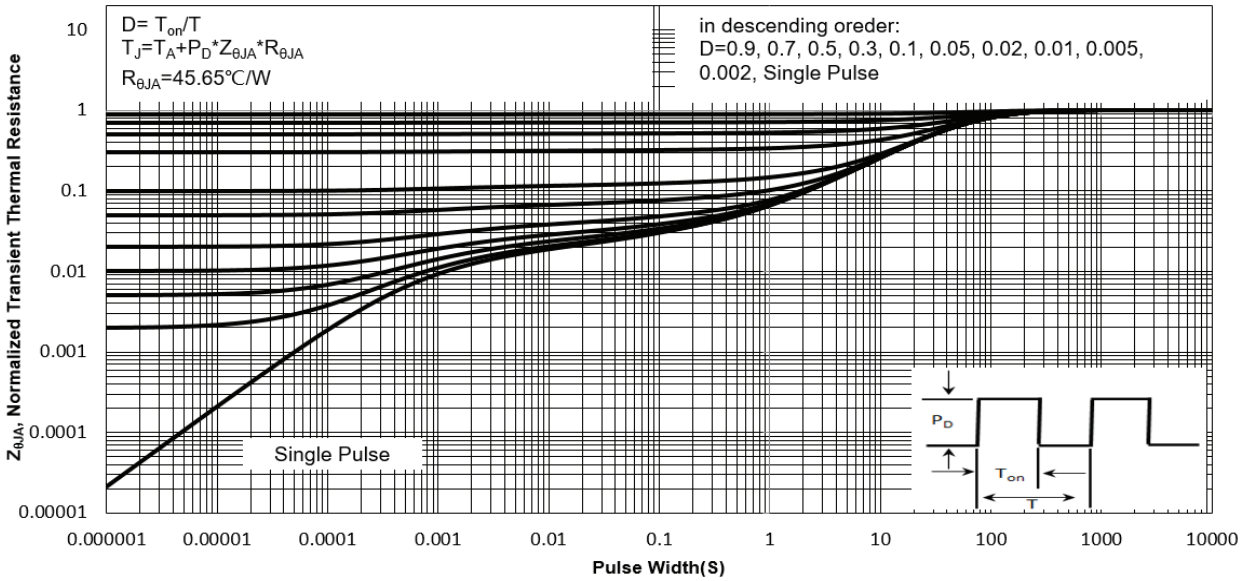


Fig.14 Normalized Maximum Transient Thermal Impedance($Z_{\Theta JA}$)



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Test Circuits

Fig.1-1 Switching times test circuit

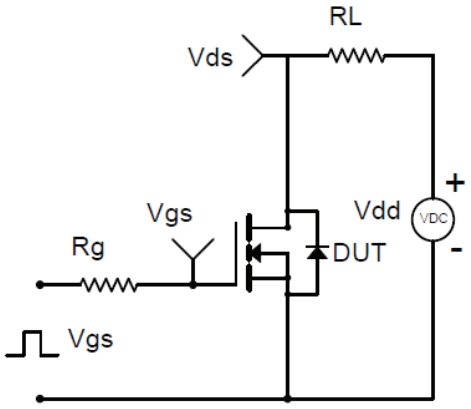


Fig.1-2 Switching Waveform

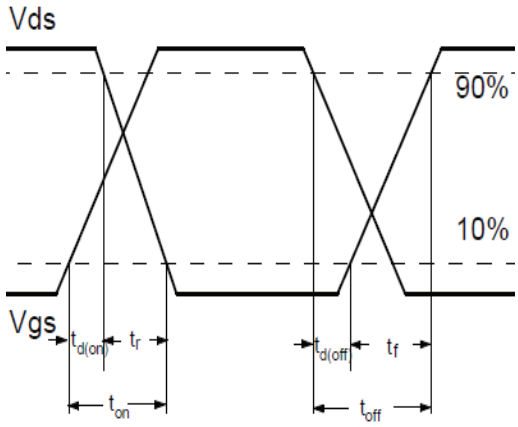


Fig.2-1 Gate charge test circuit

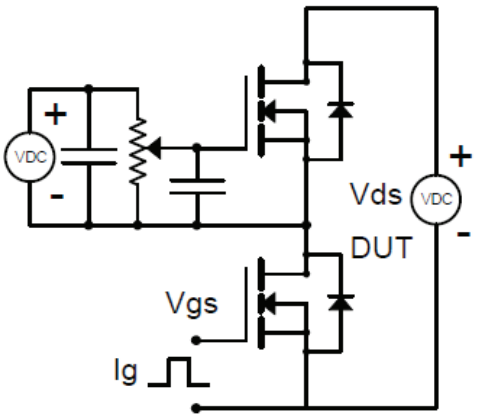


Fig.2-2 Gate charge waveform

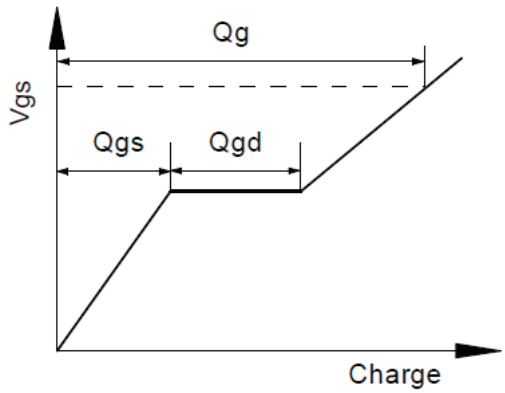


Fig.3-1 Avalanche test circuit

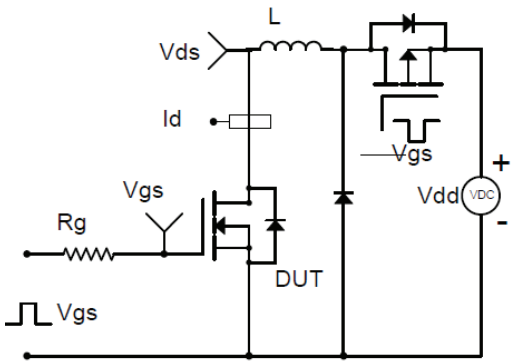
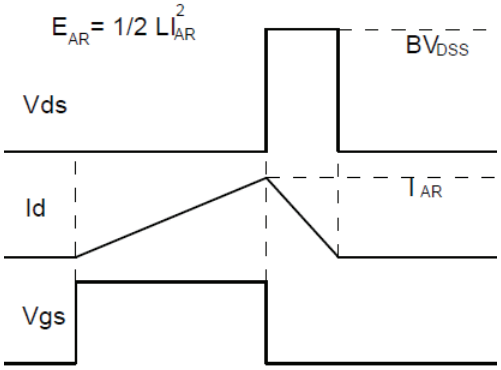


Fig.3-2 Avalanche waveform



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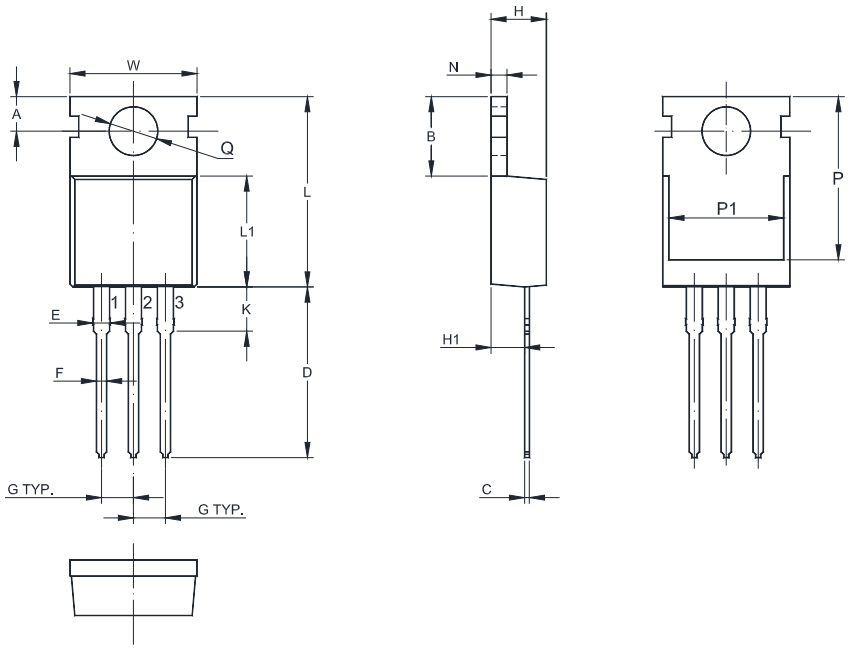
Package Outline Dimensions (Units: mm)

TO-220FB



UNIT	A	B	C	D	E	F	G	W	H	H1	K	L	L1	N
mm	2.9	6.8	0.7	15	1.5	0.9	2.54 TYP	10.2	4.7	2.5	3.1	16.8	9.4	1.4
	2.7	6.4	0.3	11	1.1	0.7		9.8	4.3	2.2	2.7	14.8	9.0	1.2

UNIT	P	P1	Q
mm	13.3	8.2	3.7
	12.7	7.6	3.5

Packing information

Package	Carton Quantity	Box Quantity	Base Quantity	Delivery Mode
TO-220FB	5 K / Carton	1 K / Box	50 pcs / Tube	Tube

Marking information

" DCTE6N055LK " = Part No.
" ****** " = Date Code Marking
Font type: Arial

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Fig. 7 Typical Junction Capacitance

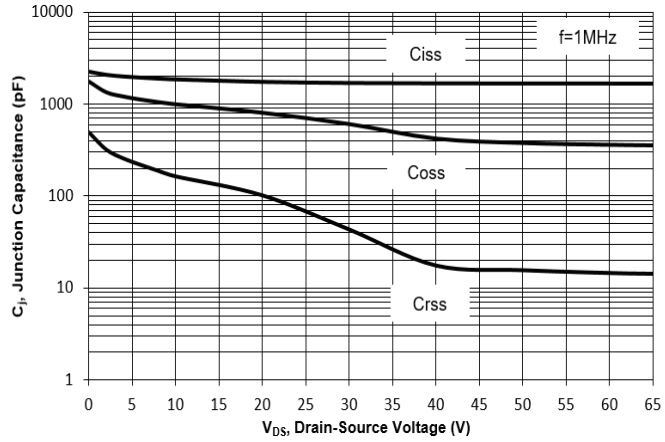


Fig. 8 Drain-Source Leakage Current vs. T_j

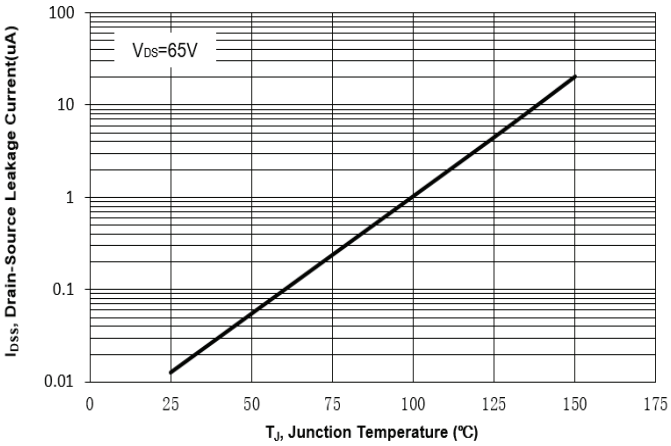


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

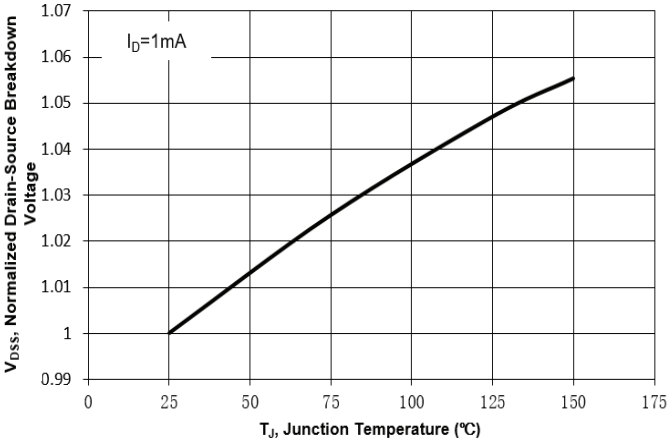


Fig. 10 Gate Threshold Variation vs. T_j

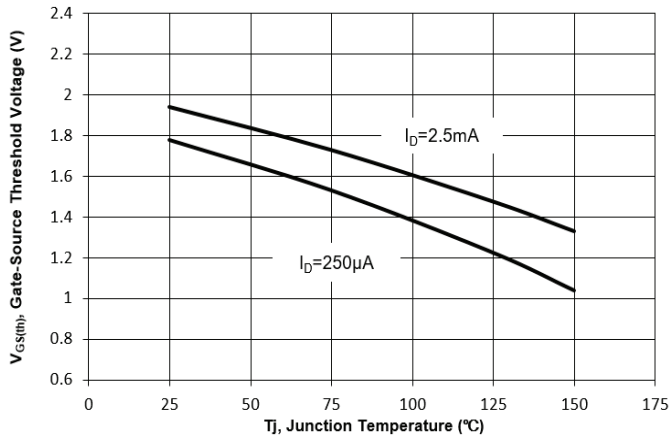


Fig. 11 Gate Charge

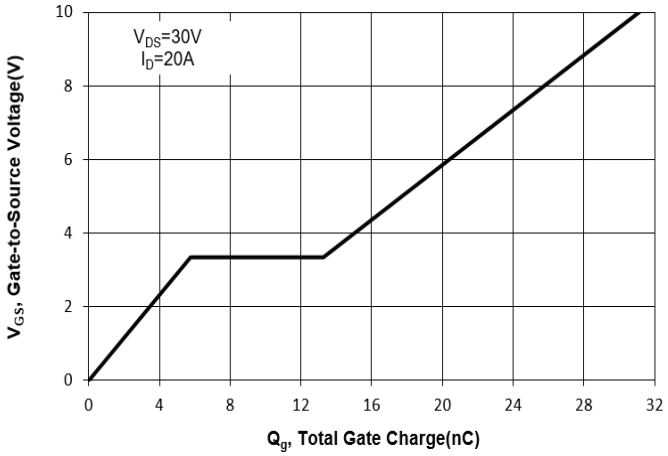
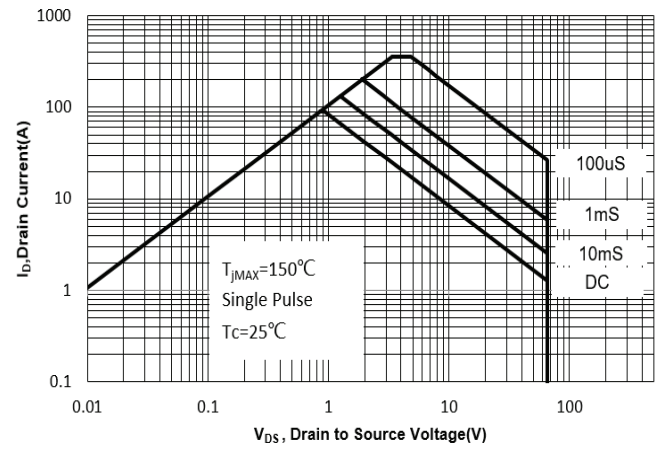


Fig. 12 Safe Operation Area



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