

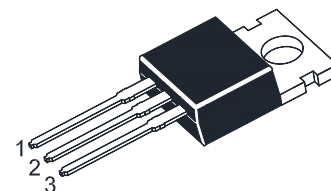
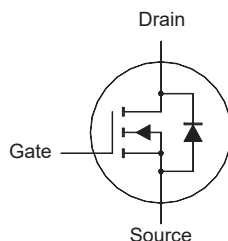
N-Channel Enhancement Mode MOSFET

Features

- Low $R_{DS(ON)}$
- AEC-Q101 Qualified
- Low Miller Capacitance
- Fully Characterized Capacitance and Avalanche
- Halogen and Antimony Free(HAF), RoHS compliant

Application

- BLDC Motor drive applications
- Battery powered circuits
- Synchronous rectifier applications
- Resonant mode power supplies



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

Key Parameters

Parameter	Value	Unit
BV_{DSS}	100	V
$R_{DS(ON)} \text{ Max}$	4.8 @ $V_{GS} = 10 \text{ V}$	$m\Omega$
	6.3 @ $V_{GS} = 4.5 \text{ V}$	
$V_{GS(th)} \text{ typ}$	1.7	V
$Q_g \text{ typ}$	75 @ $V_{GS} = 10 \text{ V}$	nC

Absolute Maximum Ratings (at $T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	85	A
		53	
Peak Drain Current, Pulsed ¹⁾	I_{DM}	480	A
Avalanche Current	I_{AS}	24	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	144	mJ
Power Dissipation	P_D	61.9	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	40	$^\circ\text{C/W}$

Characteristics at $T_a = 25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $I_D = 250\ \mu\text{A}$	BV_{DS}	100	-	-	V
Drain-Source Leakage Current at $V_{DS} = 100\ \text{V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current at $V_{GS} = \pm 20\ \text{V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	$V_{GS(th)}$	1.2	-	2.4	V
Drain-Source On-State Resistance at $V_{GS} = 10\ \text{V}$, $I_D = 50\ \text{A}$ at $V_{GS} = 4.5\ \text{V}$, $I_D = 20\ \text{A}$	$R_{DS(on)}$	- -	3.9 -	4.8 6.3	m Ω
DYNAMIC PARAMETERS					
Forward Transconductance at $V_{DS} = 5\ \text{V}$, $I_D = 30\ \text{A}$	g_{fs}	-	104	-	S
Gate Resistance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	R_g	-	1	-	Ω
Input Capacitance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 50\ \text{V}$, $f = 1\ \text{MHz}$	C_{iss}	-	3742	-	pF
Output Capacitance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 50\ \text{V}$, $f = 1\ \text{MHz}$	C_{oss}	-	698	-	pF
Reverse Transfer Capacitance at $V_{GS} = 0\ \text{V}$, $V_{DS} = 50\ \text{V}$, $f = 1\ \text{MHz}$	C_{rss}	-	34	-	pF
Gate charge total at $V_{DS} = 50\ \text{V}$, $I_D = 50\ \text{A}$, $V_{GS} = 10\ \text{V}$ at $V_{DS} = 50\ \text{V}$, $I_D = 50\ \text{A}$, $V_{GS} = 4.5\ \text{V}$	Q_g	- -	75 40	- -	nC
Gate to Source Charge at $V_{DS} = 50\ \text{V}$, $I_D = 50\ \text{A}$, $V_{GS} = 10\ \text{V}$	Q_{gs}	-	14	-	nC
Gate to Drain Charge at $V_{DS} = 50\ \text{V}$, $I_D = 50\ \text{A}$, $V_{GS} = 10\ \text{V}$	Q_{gd}	-	22	-	nC
Turn-On Delay Time at $V_{DS} = 50\ \text{V}$, $I_D = 50\ \text{A}$, $V_{GS} = 10\ \text{V}$, $R_g = 3.3\ \Omega$	$t_{d(on)}$	-	26	-	ns
Turn-On Rise Time at $V_{DS} = 50\ \text{V}$, $I_D = 50\ \text{A}$, $V_{GS} = 10\ \text{V}$, $R_g = 3.3\ \Omega$	t_r	-	43	-	ns
Turn-Off Delay Time at $V_{DS} = 50\ \text{V}$, $I_D = 50\ \text{A}$, $V_{GS} = 10\ \text{V}$, $R_g = 3.3\ \Omega$	$t_{d(off)}$	-	23	-	ns
Turn-Off Fall Time at $V_{DS} = 50\ \text{V}$, $I_D = 50\ \text{A}$, $V_{GS} = 10\ \text{V}$, $R_g = 3.3\ \Omega$	t_f	-	8	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $I_S = 1\ \text{A}$, $V_{GS} = 0\ \text{V}$	V_{SD}	-	-	1.3	V
Body-Diode Continuous Current	I_S	-	-	85	A
Body-Diode Continuous Current, Pulsed	I_{SM}	-	-	480	A
Body Diode Reverse Recovery Time at $I_S = 50\ \text{A}$, $V_{DD} = 50\ \text{V}$, $di/dt = 200\ \text{A} / \mu\text{s}$	t_{rr}	-	48	-	ns
Body Diode Reverse Recovery Charge at $I_S = 50\ \text{A}$, $V_{DD} = 50\ \text{V}$, $di/dt = 200\ \text{A} / \mu\text{s}$	Q_{rr}	-	106	-	nC

Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

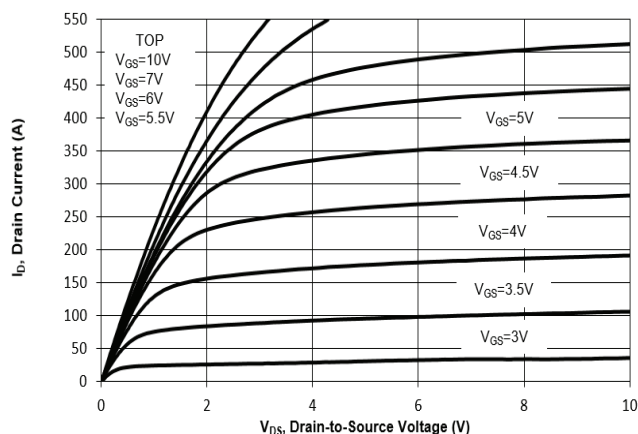


Fig. 2 Typical Transfer Characteristics

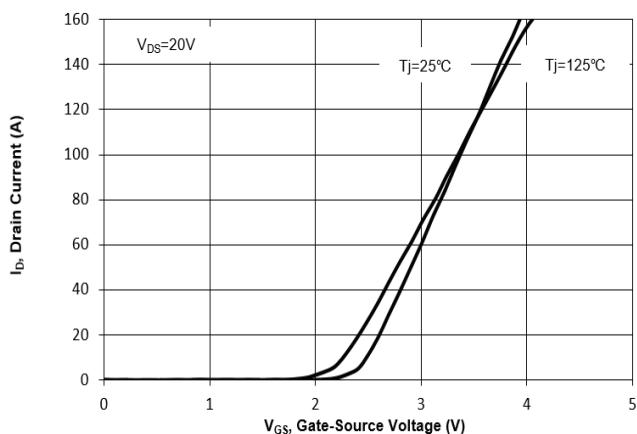


Fig. 3 On-Resistance vs. Drain Current

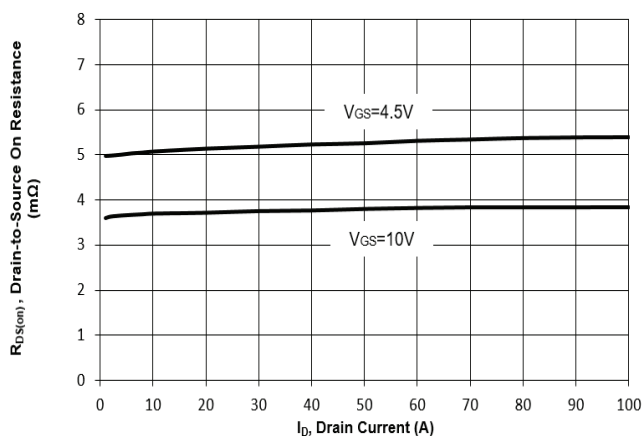


Fig. 4 On-Resistance vs. Gate Voltage

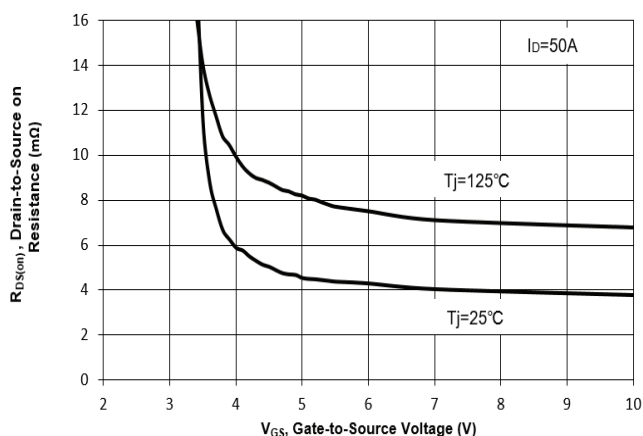


Fig. 5 On-Resistance vs. TJ

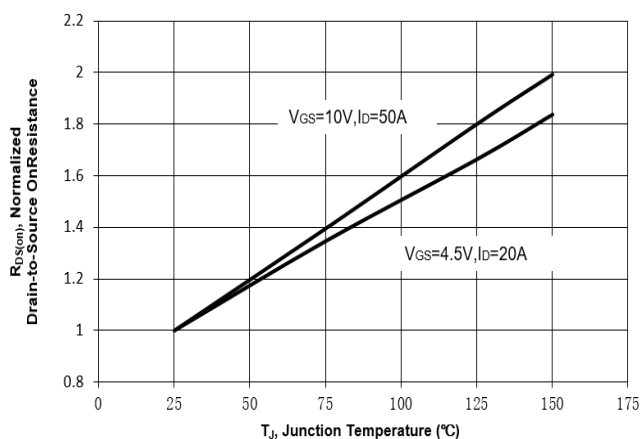
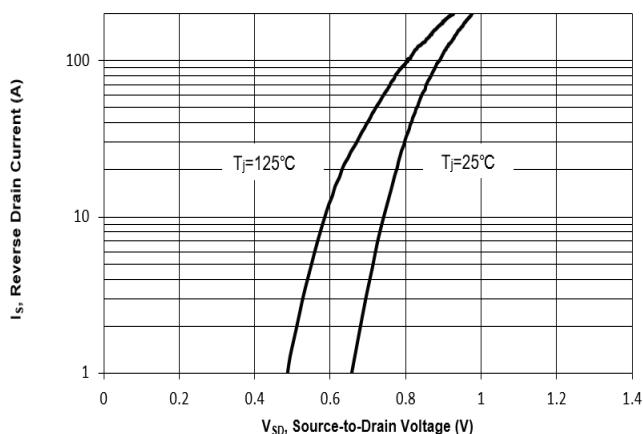


Fig. 6 Typical Body-Diode Forward Characteristics



Electrical Characteristics Curves

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

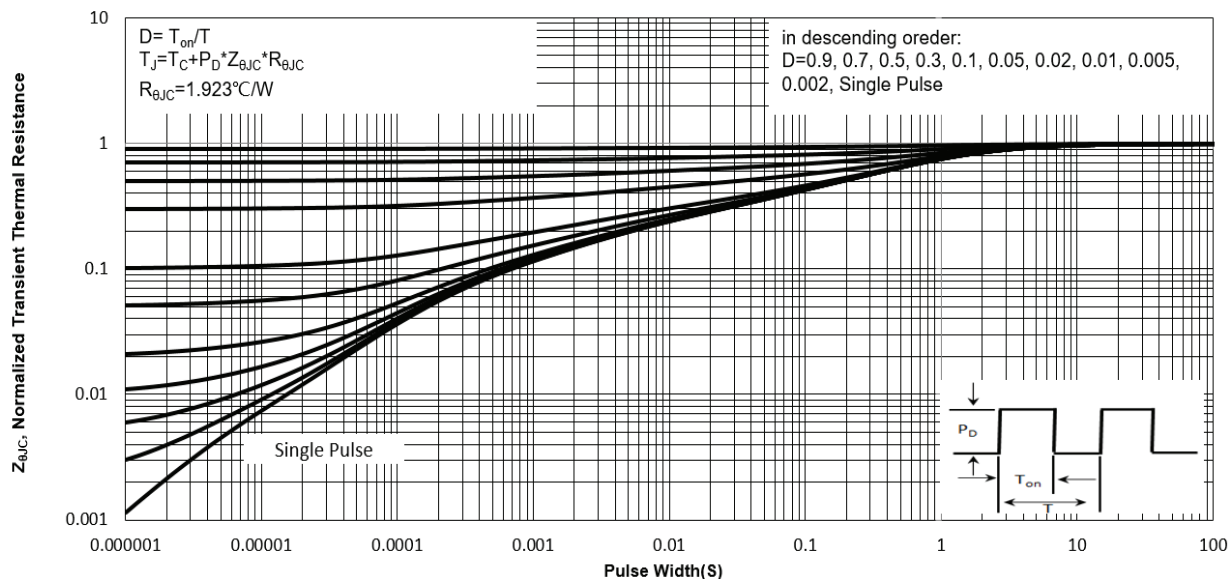
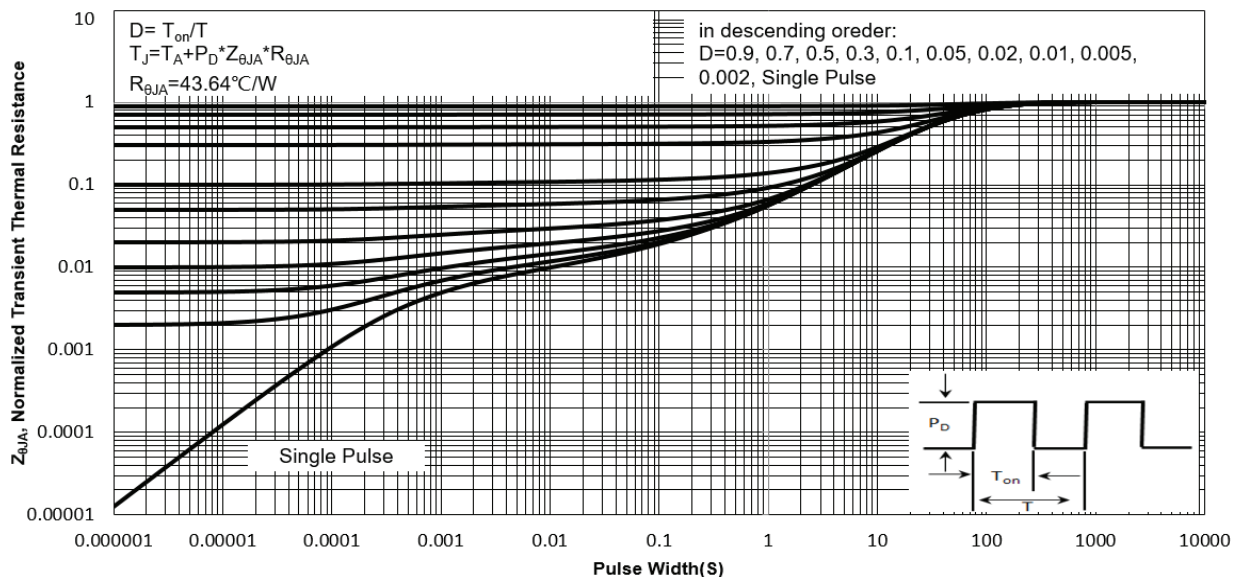
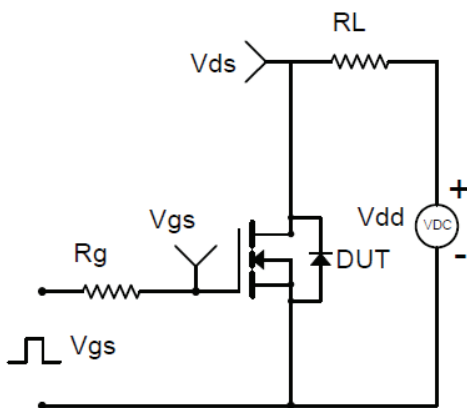
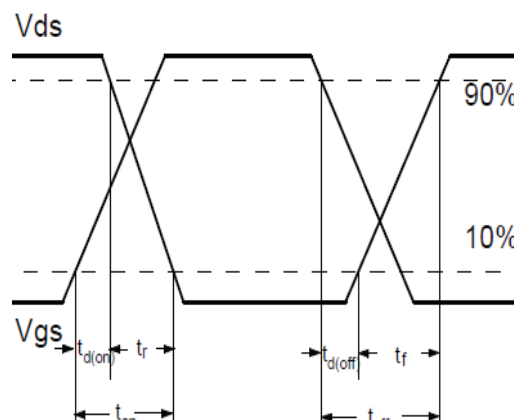
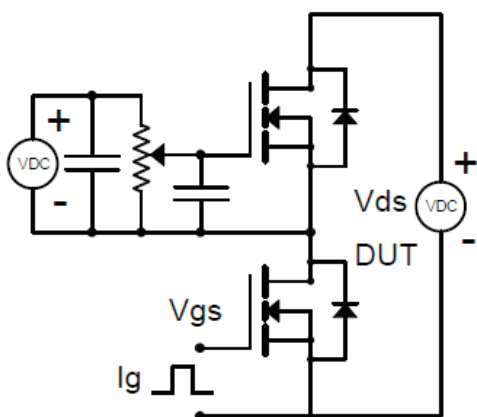
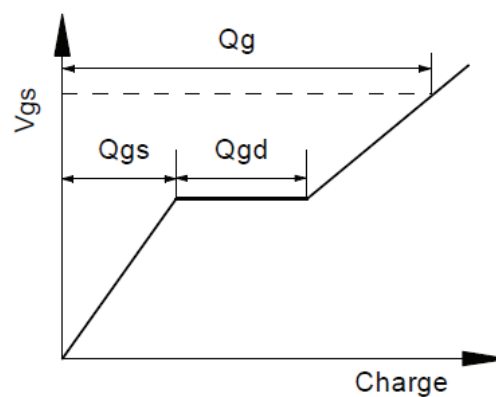
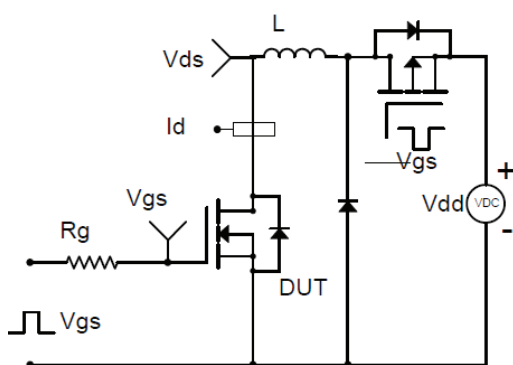
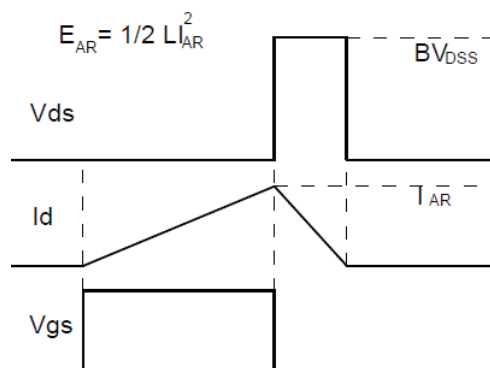


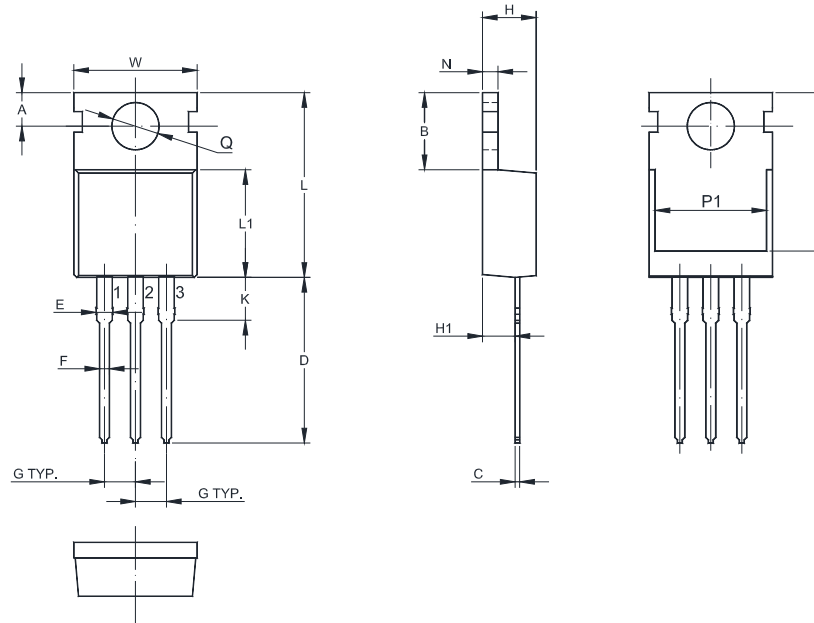
Fig. 14 Normalized Maximum Transient Thermal Impedance($Z_{\theta JA}$)



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


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	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	TYP	9.8	4.3	2.2	2.7	14.8	9.0	1.2

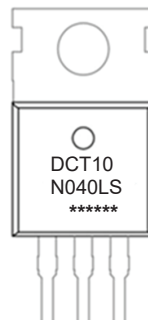
UNIT	P	P1	Q
mm	13.3	8.2	3.7
	12.7	7.6	3.5

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

" DCT10N040LS " = Part No.
 " ***** " = Date Code Marking
 Font type: Arial



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Fig. 7 Typical Junction Capacitance

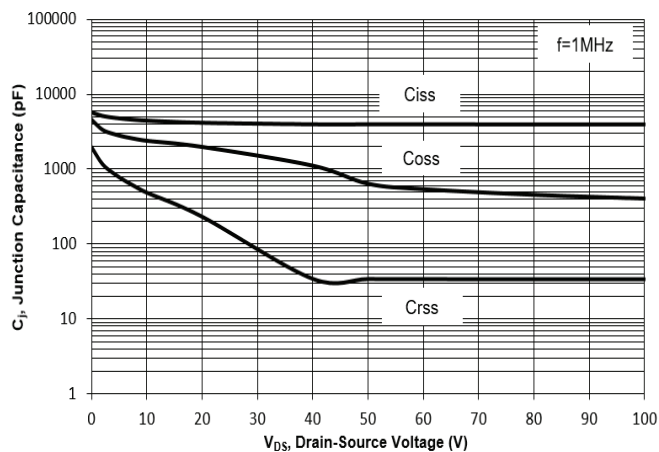


Fig. 8 Drain-Source Leakage Current vs. T_J

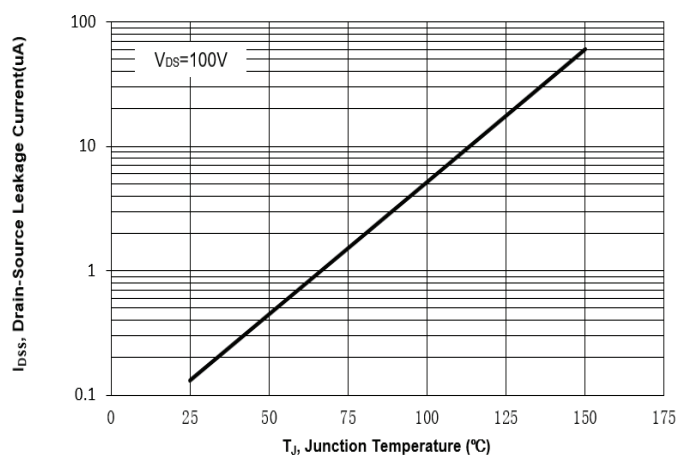


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

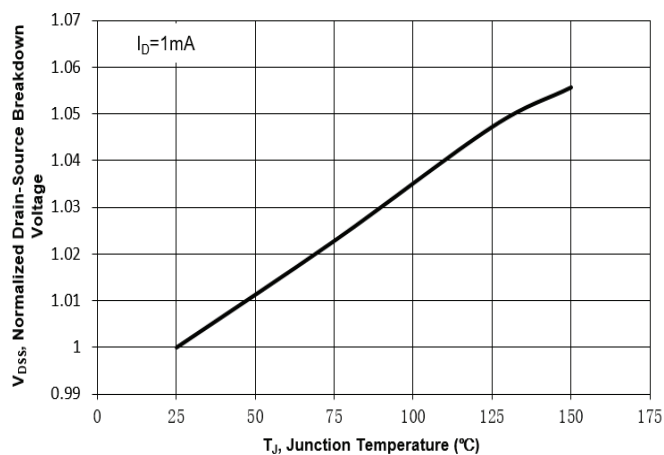


Fig. 10 Gate Threshold Variation vs. T_J

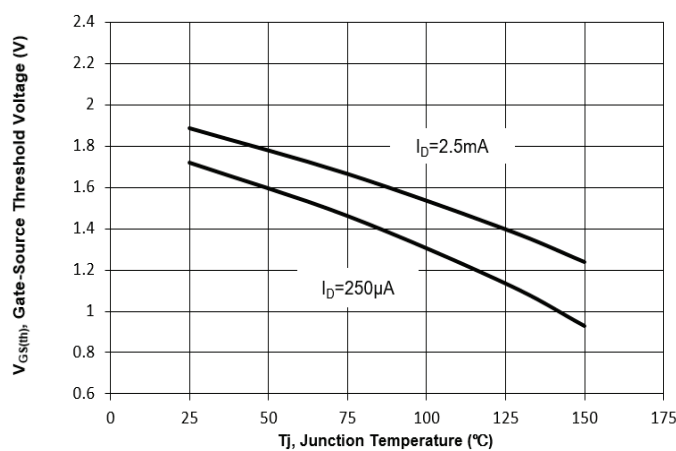


Fig. 11 Gate Charge

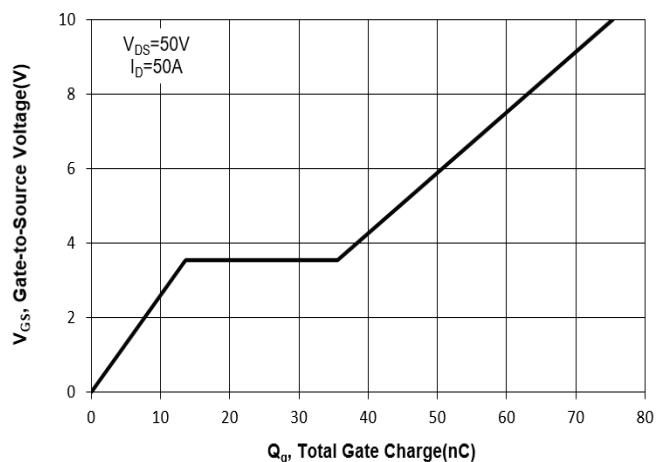


Fig. 12 Safe Operation Area

