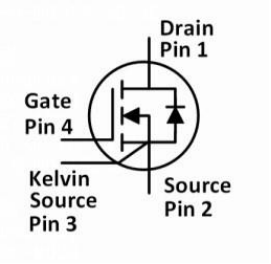
Revision History

Rev. No.	History	Issue Date
1.0	New issue	Oct. 15,2025

Nano Meter Coated (NMC)SIC MOSFET

■ Features

- Effectively lower down Tj and Rth, better anti- EMI ability
- High speed Switching with Low Capacitances
- High blocking voltage with low on-resistance
- Easy to Parallel and Simple to Drive
- Anti- Latch-Up
- Halogen Free, RoHS Compliant



TO-247-4L

■ Applications

- EV Charging Station
- Power Factor Correction or DC/DC Converters
- Solar Inverters
- Motor Drives
- Switch mode power supplies

Top Mark:	CSiC120040T1	
Ordering P/N:	CSiC120040T1	
Parameter	**Value**	**Unit**
V_{DS}	1200	V
I_D(Tc=25℃)	88	A
$R_{DS(ON)}$	40	mΩ
$T_{j,max}$	175	℃

■ Absolute Maximum Ratings

(Tj=25℃ unless otherwise specified)

Parameter	Symbol	Condition	Value	Unit
Drain-Source Voltage	V_{DSmax}	V_{GS}=0V, I_D=100uA	1200	V
Gate-Source Voltage	V_{GSmax}	Absolute maximum values	-10/+22	V
Gate-Source Voltage	V_{GSop}	Recommended operational values	-5/+18	V
Continuous Drain Current	I_D	V_{GS}=18V, T_C=25℃	88	A
		V_{GS}=18V, T_C=100℃	62	
Pulsed Drain Current	$I_{D(pulse)}$	Pulse width t_p limited by T_{jmax}	180	A
Power Dissipation	P_D	T_C=25℃, T_J=175℃	417	W
Operating Junction Temperature	$T_{vj, op}$		-55~175	℃
Storage Temperature Range	T_{stg}		-55~175	℃

■ Electrical Characteristics (T_c=25℃ unless otherwise noted)

Parameter	Symbol	Condition		Value			Unit
				Min	Typ.	Max	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=100μA		1200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=10mA	T_{vj}=25℃	2.3	3.2	4	V
			T_{vj}=175℃		2.3		
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1200V, V_{GS}=0V			1	50	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=18V, V_{DS}=0V			10	250	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=18V, I_D=40A	T_{vj}=25℃		38	53	mΩ
			T_{vj}=175℃		53		
Transconductance	g_{fs}	V_{DS}=20V, I_{DS}=40A	T_{vj}=25℃		27.6		S
			T_{vj}=175℃		21		
Input Capacitance	C_{iss}	V_{GS}=0V V_{DS}=1000V f=100KHz V_{AC}=25mV			3030		pF
Output Capacitance	C_{oss}				125		
Reverse Transfer Capacitance	C_{rss}				10		
C_{oss} Stored Energy	E_{oss}				135		μJ
Avalanche Energy, Single Pluse	E_{AS}	I_D=40A, V_{DD}=50V			2		J
Turn-On Switching Energy	E_{ON}	V_{DS}=800V, V_{GS}=-5/18V I_D=40A, $R_{G(ext)}$=2.5Ω, T_J=25℃, L=150μH			0.6		mJ
Turn Off Switching Energy	E_{OFF}				0.1		
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=800V, V_{GS}=-5/18V I_D=40A, $R_{G(ext)}$=2.5Ω, T_J=25℃, L=150μH Timing relative to V_{DS}			16		ns
Rise Time	t_r				22		
Turn-Off Delay Time	$t_{d(off)}$				20		
Fall Time	t_f				10		
Gate to Source Charge	Q_{gs}	V_{DS}=800V, V_{GS}=-5/18V I_D=40A			47		nC
Gate to Drain Charge	Q_{gd}				41		
Total Gate Charge	Q_g				132		

■ Body Diode Characteristics (T_{vj}=25℃ unless otherwise noted)

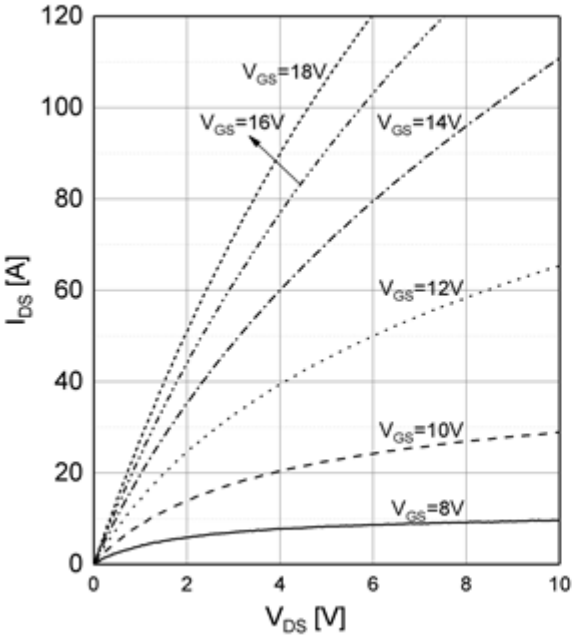
Parameter	Symbol	Condition		Value			Unit
				Min	Typ.	Max	
Diode Forward Voltage	V_{SD}	V_{GS}=-5V, I_{SD}=20A	T_{vj}=25℃		4.5		V
			T_{vj}=175℃		4.1		
Continuous Diode Forward Current	I_S	V_{GS}=-5V, T_C=25˚C				75	A
Diode Pulse Current	$I_{S(pulse)}$	V_{GS}=-5V, Pulse width t_p limited by T_{jmax}				180	A
Reverse Recovery Time	t_{rr}	V_{GS}=-5V I_{SD}=40A $R_{G(ext)}$=7.5Ω T_J=25℃ V_R=800V			59		ns
Reverse Recovery Charge	Q_{rr}				3		uC
Peak Reverse Recovery Current	I_{rrm}				22		A

■ Thermal Characteristics

Parameter	Symbol	Condition	Value			Unit
			Min	Typ.	Max	
Thermal Resistance: Junction to Case	$R_{th(J-C)}$			0.36	0.46	℃/W

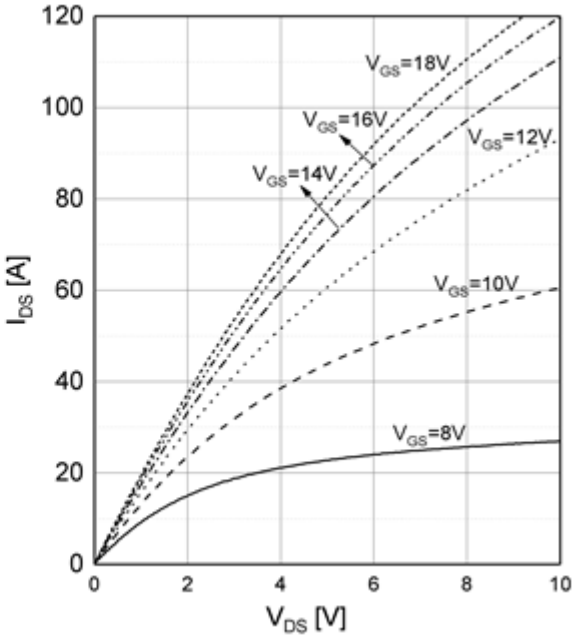
Output Characteristics

$I_{DS}=f(V_{DS})$, $T_J=25℃$



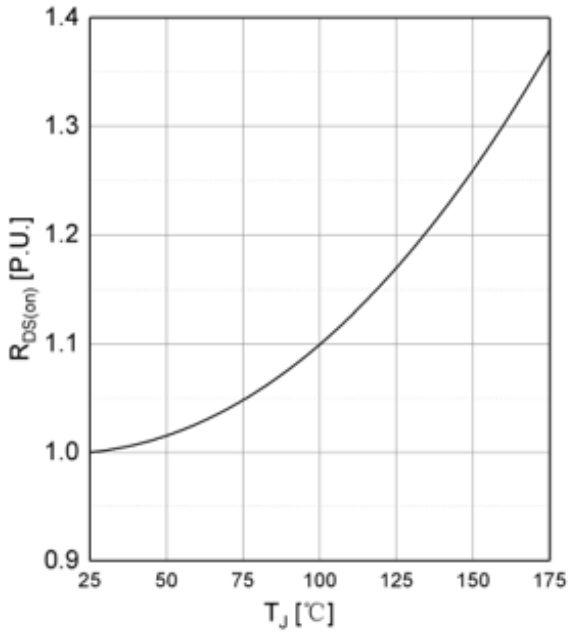
Output Characteristics

$I_{DS}=f(V_{DS})$, $T_J=175℃$



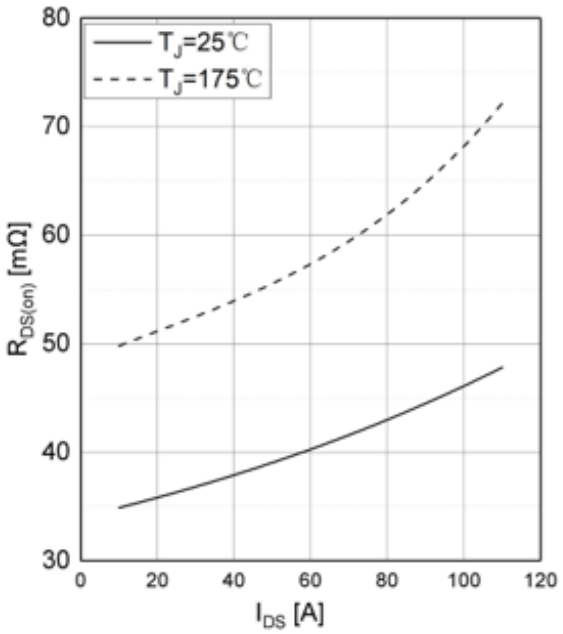
Normalized On-Resistance

$R_{DS(on)}=f(T_J)$, $I_{DS}=40A$, $V_{GS}=18V$



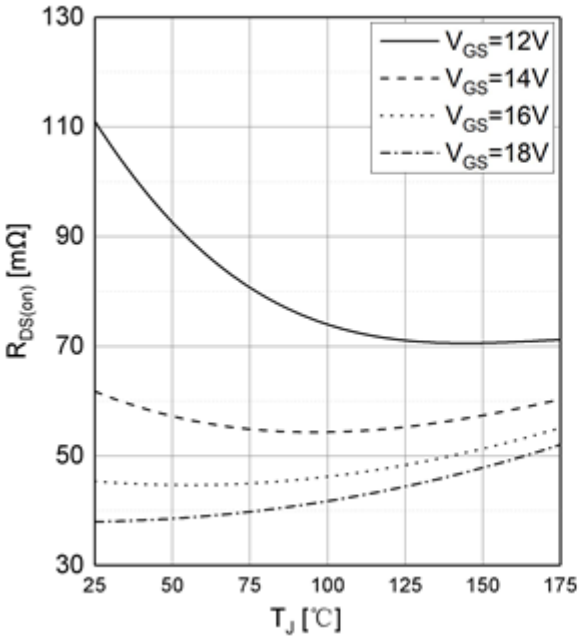
On-Resistance

$R_{DS(on)}=f(I_{DS})$, $V_{GS}=18V$



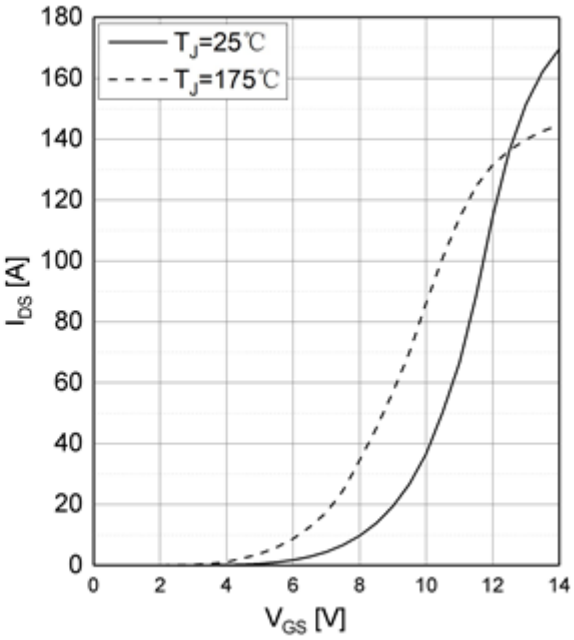
On-Resistance

$R_{DS(on)}=f(T_J)$, $I_{DS}=40A$



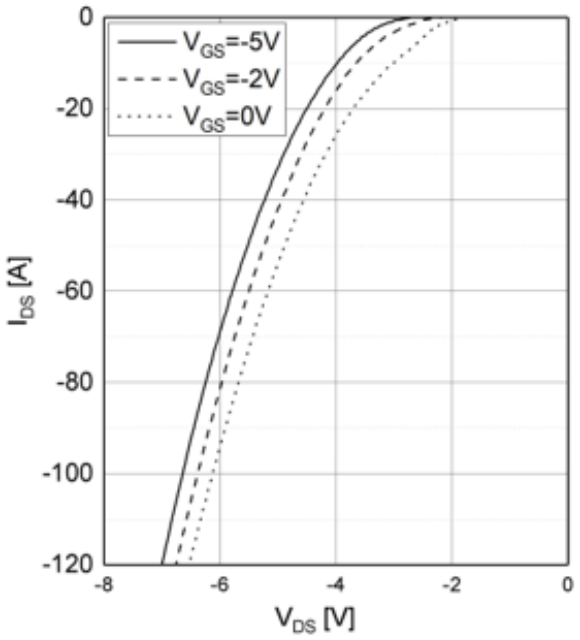
Transfer Characteristics

$I_{DS}=f(V_{GS})$, $V_{DS}=20V$



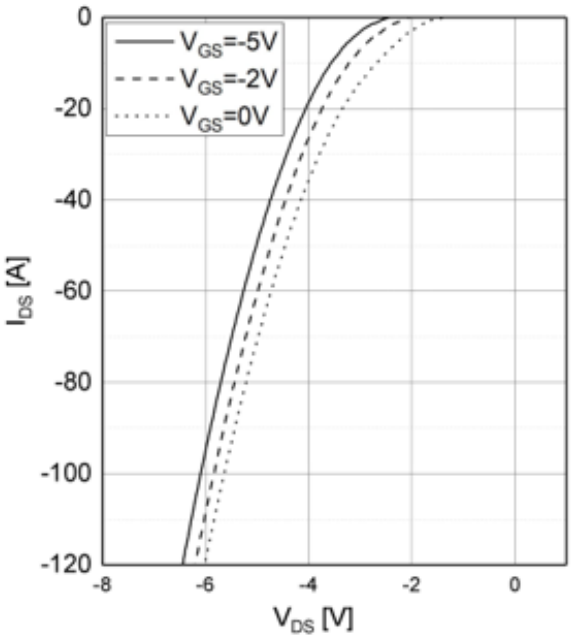
Body Diode Characteristics

$I_{DS}=f(V_{DS})$, T_J=25℃



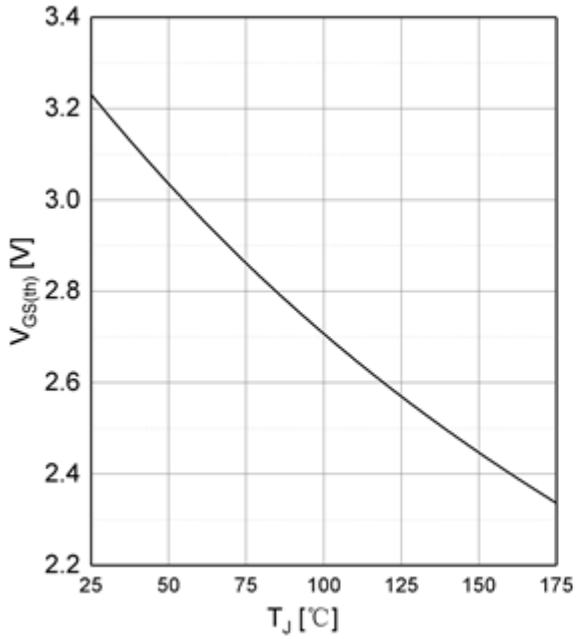
Body Diode Characteristics

$I_{DS}=f(V_{DS})$, T_J=175℃



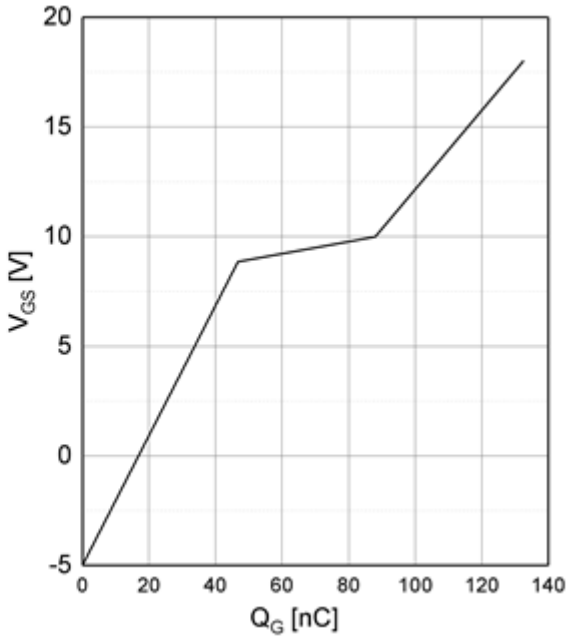
Threshold Voltage

$V_{GS(th)}=f(T_J)$, $V_{GS}=V_{DS}$, $I_{DS}=10mA$



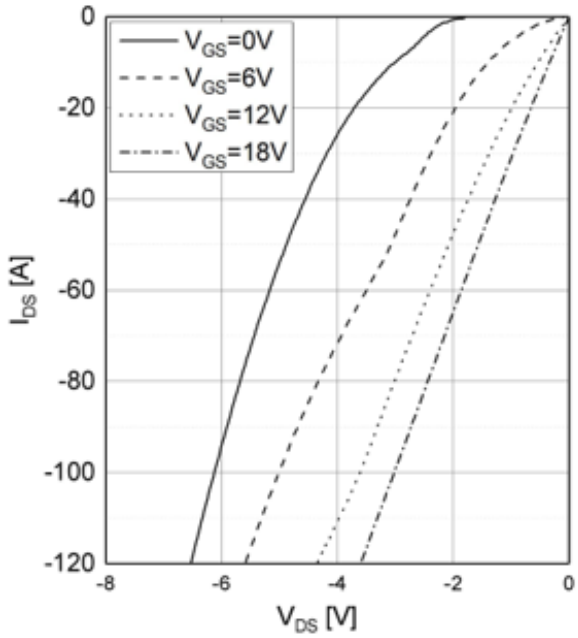
Gate Charge Characteristics

$V_{GS}=f(Q_G)$, $I_{DS}=40A$, $I_{GS}=50mA$, $V_{DS}=800V$, $T_J=25℃$



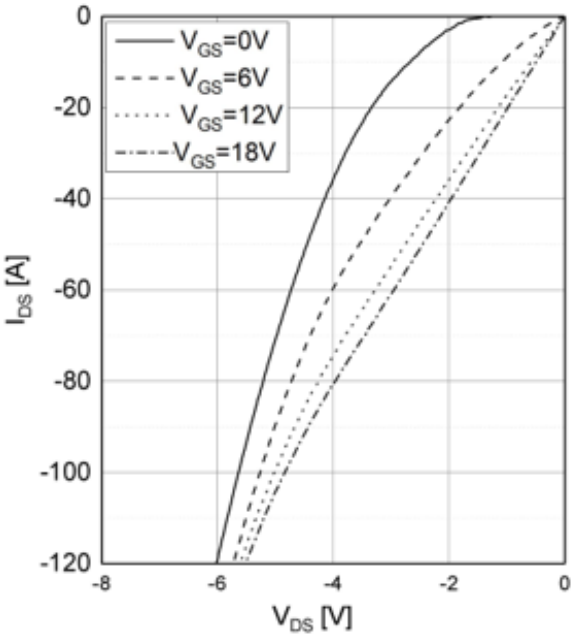
3rd Quadrant Characteristics

$I_{DS}=f(V_{DS})$, $T_J=25℃$



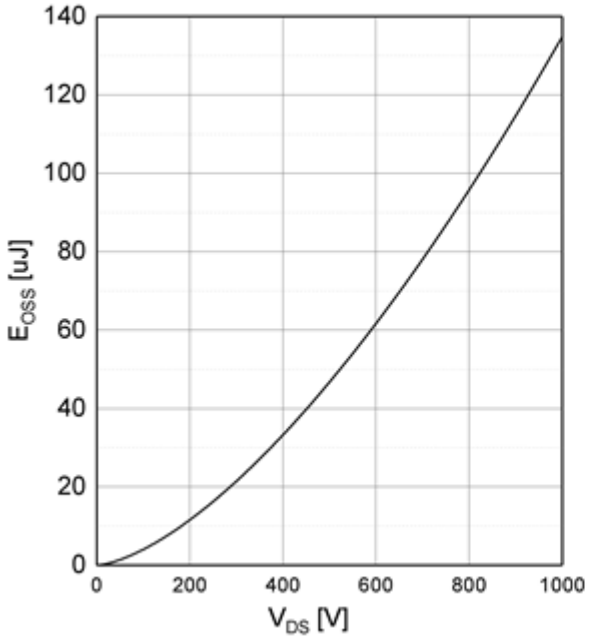
3rd Quadrant Characteristics

$I_{DS}=f(V_{DS})$, $T_J=175℃$



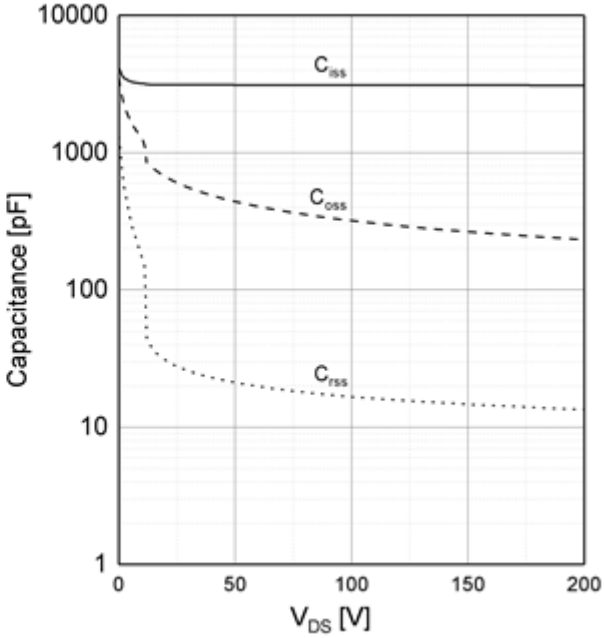
Output Capacitor Stored Energy

$E_{OSS}=f(V_{DS})$



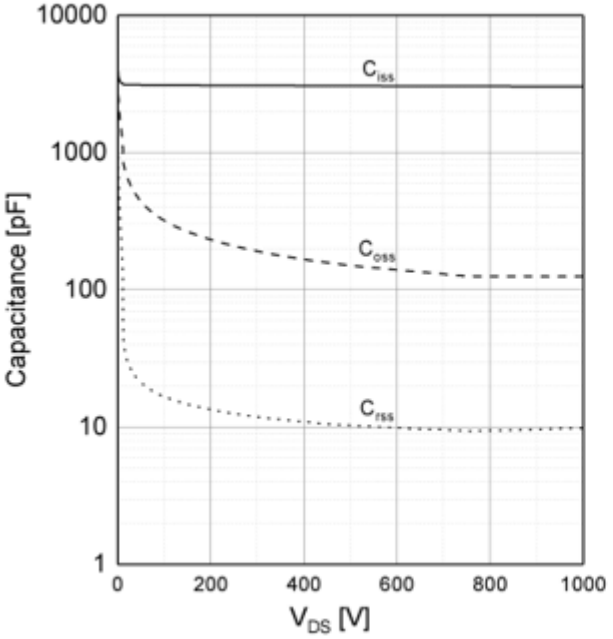
Capacitances

Capacitances=f(V_{DS}), T_J=25℃, V_{AC}=25mV, f=100KHz, (0-200V)



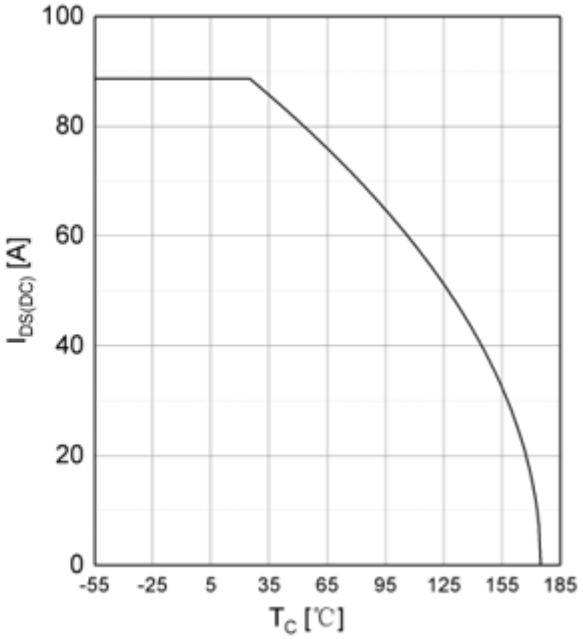
Capacitances

Capacitances=f(V_{DS}), T_J=25℃, V_{AC}=25mV, f=100KHz, (0-1000V)



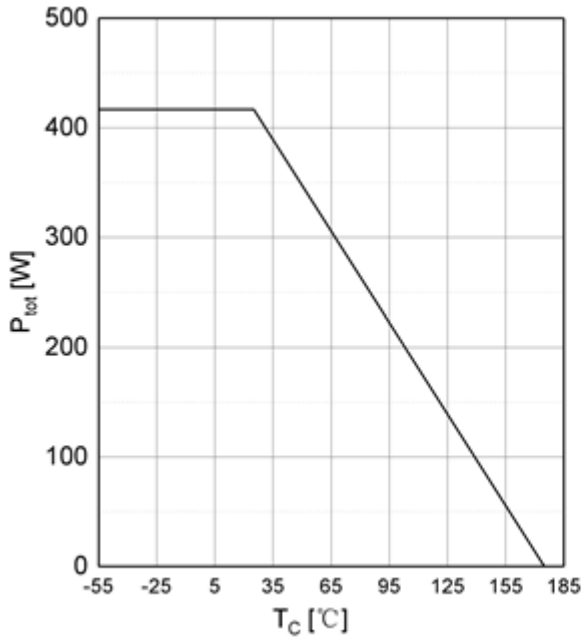
Continuous Drain Current Derating

$I_{DS(DC)}=f(T_C)$, T_J≤175℃



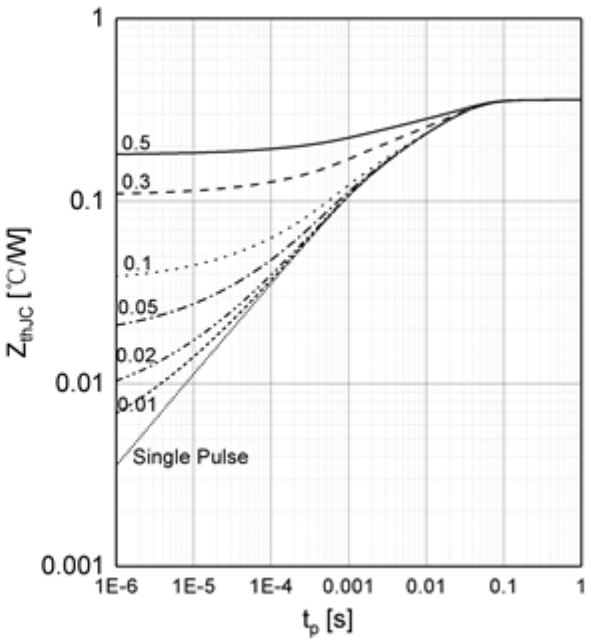
Maximum Power Dissipation Derating

$P_{tot}=f(T_C)$, $T_J \leq 175℃$



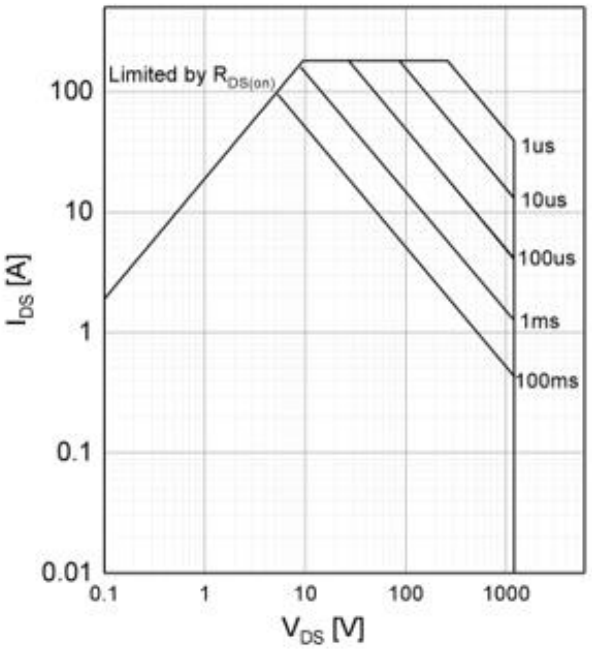
Transient Thermal Impedance(Junction-Case)

$Z_{thJC}=f(t_p)$



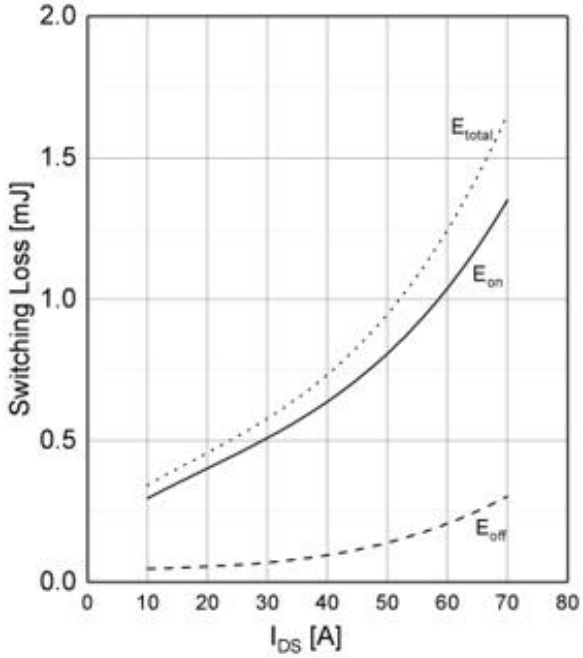
Safe Operating Area

$I_{DS}=f(V_{DS})$, $T_C=25℃$, D=0, Parameter: t_p

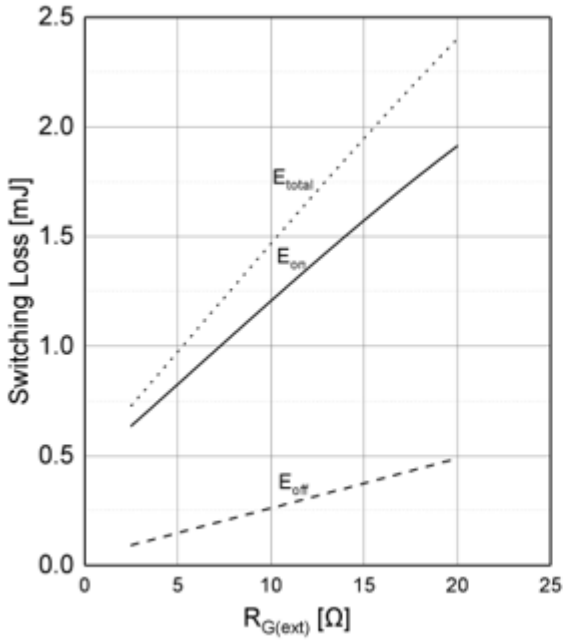


Switching Energy

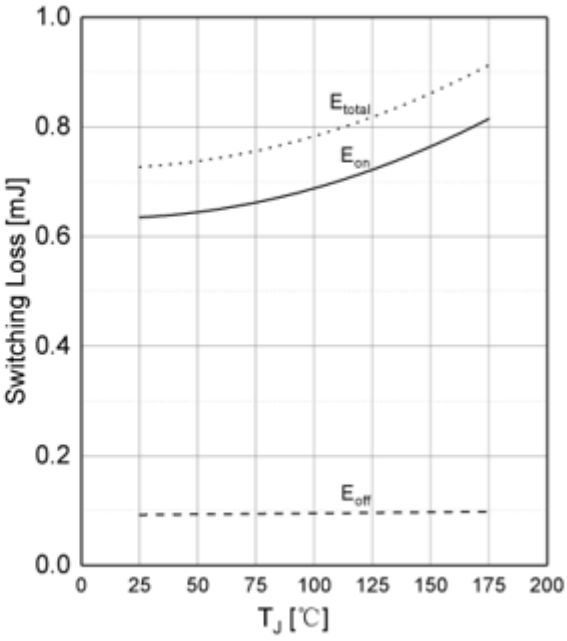
Switching Loss=f(I_{DS}), $T_J=25℃$, $V_{DD}=800V$, $R_{G(ext)}=2.5\Omega$, $V_{GS}=-5V/+18V$, L=150uH



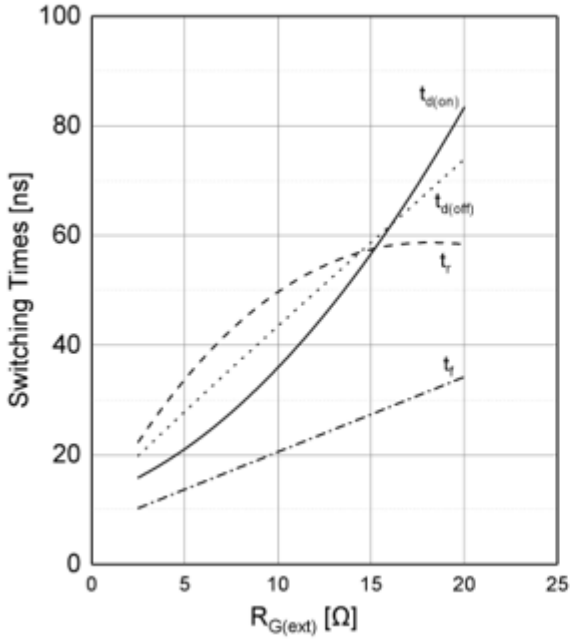
Switching Energy
Switching Loss=f($R_{G(ext)}$), T_J=25℃, V_{DD}=800V , I_{DS}=40A,V_{GS}=-5V/+18V, L=150uH



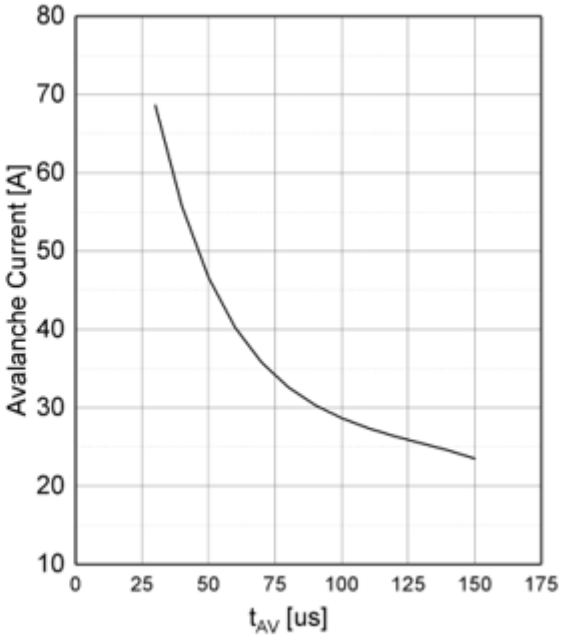
Switching Energy
Switching Loss=f(T_J), V_{DD}=800V, I_{DS}=40A, $R_{G(ext)}$=2.5Ω,V_{GS}=-5V/+18V, L=150uH

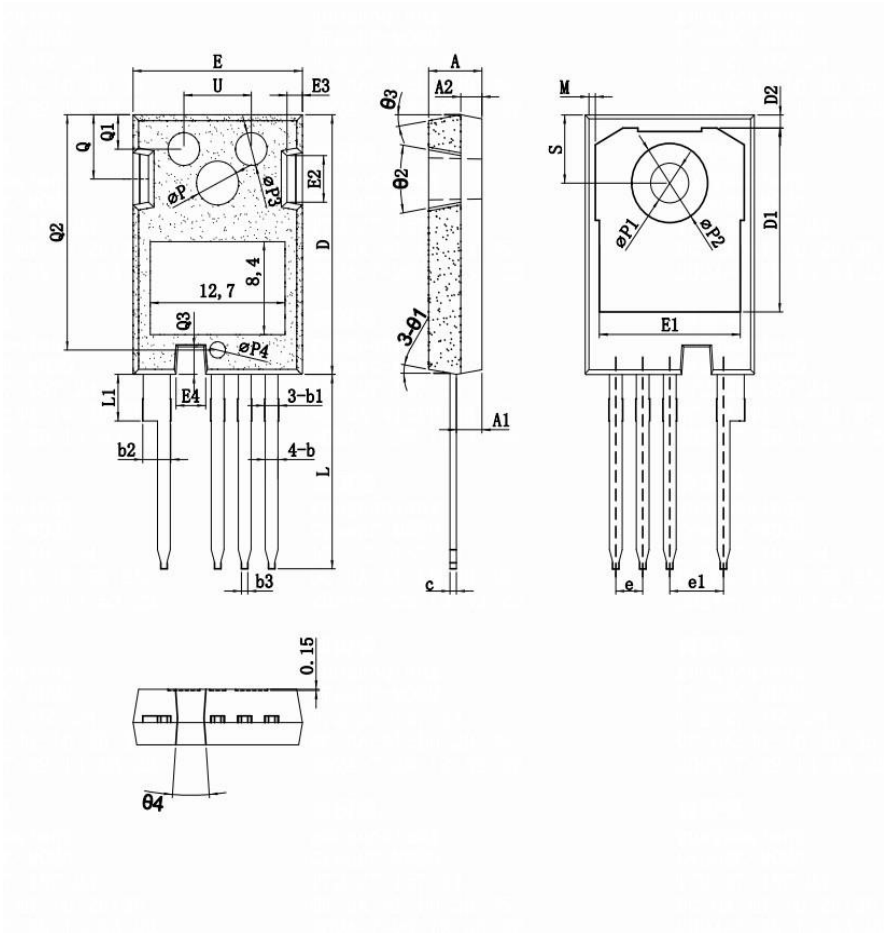


Switching Times
Switching Times=f($R_{G(ext)}$), T_J=25℃ V_{DD}=800V, I_{DS}=40A, V_{GS}=-5V/+18V, L=150uH



Single Avalanche Safe Operating Area
Avalanche Current=f(t_{AV}), T_J=25℃, V_{DD}=50V





SYMBOL	mm		
	MIN	NOM	MAX
*A	4.83	5.02	5.21
*A1	2.29	2.42	2.54
A2	1.91	2.00	2.16
*b	1.07	1.20	1.33
*b1	1.15	1.30	1.45
*b2	2.39	2.67	2.94
b3	0.45	0.60	0.75
*c	0.55	0.60	0.68
*D	23.30	23.45	23.60
D1	16.35	16.65	16.95
D2	0.95	1.19	1.25
*E	15.75	15.94	16.13
E1	13.10	13.25	13.40
E2	4.00	4.40	4.80
E3	1.00	1.45	1.90
E4	2.40	2.80	3.20
*e	2.50	2.54	2.58
*e1	5.03	5.08	5.13
*L	17.31	17.57	17.82
*L1	–	–	4.37
M	0.40	0.60	0.80
*ΦP	3.90	4.00	4.10
*ΦP1	3.51	3.61	3.71
ΦP2	7.03	7.18	7.33
ΦP3	2.80	3.00	3.20
ΦP4	1.30	1.50	1.70
Q	5.49	5.79	6.00
Q1	2.80	3.10	3.40
Q2	19.95	21.25	21.55
Q3	2.35	2.50	2.65
S	6.04	6.17	6.30
U	6.05	6.35	6.55
θ1	6°	10°	13°
θ2	16°	20°	24°
θ3	6°	10°	13°
θ4	5°	8°	11°

Package Outline

Common Dimensions