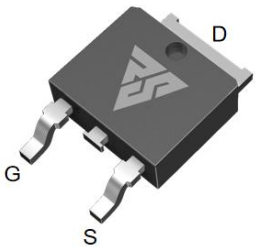
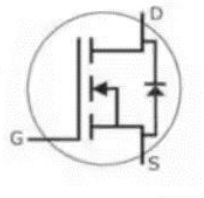
V_{DS}	$R_{DS(on)Typ}$	I_D@25℃
800V	120mΩ	20A





RoHS REACH HF

Applications:

- LED driver
- PD charger
- PC adapter
- Air-conditioning
- E-bike charger

Features:

- Revolutionary semiconductor material Silicon Carbide
- High blocking voltage with low on-resistance
- High-speed switching with very low switching losses
- High-speed and high robust intrinsic body diode

Ordering Information

Part Number	Package	Marking	Packing	Qty.
RSM080120BD	TO-252	RSM080120BD	Tape&reel	2500 PCS

Maximum Ratings (TJ= 25℃ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DS}	Drain - Source Voltage	800	V	V_{GS}=0V,I_D=250μA
V_{GS}	Gate - Source Voltage	-10/+22	V	Absolute maximum values
V_{GSOP}	Recommended Operation Voltage of Gate to Source	0/+18	V	Recommended operational values
I_D	Continuous Drain Current	20 14.4	A	T_C =25℃ T_C =100℃
I_{DM}	Pulsed Drain Current	34.5	A	T_C =25℃
E_{AS}	Single Pulse Avalanche Energy L=0.5mH,I_{AS}=10.7A,V_{DD}=50V,V_{GS}=15V	28	mJ	
P_D	Power Dissipation	82	W	T_C =25℃
T_J, T_{stg}	Operating Junction and StorageTemperature	-55 to + 175	℃	
T_{sold}	Soldering Temperature, Wave Soldering only Allowed at Leads 1.6mm from Case for 10s	260	℃	

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Electrical Characteristics (TJ= 25℃ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	800			V	V_{GS}=0V,I_D=250μA	
$V_{GS(th)}$	Gate Threshold Voltage	2.7	3.3		V	V_{GS}= V_{DS}, I_D=3.5mA	
I_{DSS}	Zero Gate Voltage Drain Current	1		50	μA	V_{DS}=800V, V_{GS}=0V	
I_{GSS}	Gate-Source Leakage Current			250	nA	V_{GS}=22V, V_{DS}=0V	
$R_{DS(on)}$	Drain-Source on-state Resistance		160	210	mΩ	V_{GS}=15V, I_D =10A	
			120	190		V_{GS}=18V, I_D =10A	
C_{iss}	Input Capacitance		427		pF	V_{GS}=0V, V_{DS}=400V f=1MHz,T_j=25℃	
C_{oss}	Output Capacitance		156				
C_{rss}	Reverse Transfer Capacitance		3.9				
gfs	Transconductance		6.9		S	V_{DS}=20V,I_D=10A	
R_G	Internal Gate Resistance		28.5		Ω	f=1MHz,V_{AC}=25mV	
Q_g	Total Gate Charge		14.5		nC	V_{DS}=400V V_{GS}=0/+15V I_D=10A	
Q_{gs}	Gate to Source Charge		5.5				
Q_{gd}	Gate to Drain Charge		2.2				
$t_{d(on)}$	Turn-On Delay Time		21.2 19.9		ns	V_{DD}=400V V_{GS} =0/15V L=600μH I_D=10A $R_{G(on)}$=2.2Ω $R_{Goff)}$=2.2Ω	T_j=25℃ T_j=175℃
t_r	Rise Time		14.4 11.2				T_j=25℃ T_j=175℃
$t_{d(off)}$	Turn-Off Delay Time		27 33				T_j=25℃ T_j=175℃
t_f	Fall Time		14.2 13.4				T_j=25℃ T_j=175℃
Eon	Turn–On Switching Loss		106 99		μJ		T_j=25℃ T_j=175℃
Eoff	Turn–Off Switching Loss		24 22				T_j=25℃ T_j=175℃
Etot	Total Switching Energy		130 121				T_j=25℃ T_j=175℃

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Reverse Diode Characteristics (TJ= 25℃ unless otherwise specified)

Symbol	Parameter	Typ.	Max	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	3.5 3.1		V	V_{GS}=0V, I_{SD} =5A	T_j=25℃ T_j=175℃
I_S	Continuous DC Source Current, Limited by $T_{VJ(max)}$	17 9		A	T_C=25℃ T_C=100℃	
I_{SM}	Peak Reverse Drain Current, tp Limited by $T_{VJ(max)}$	32		A	T_C=25℃	
I_{rrm}	Peak Reverse Recovery Current	4.8 5.8		A	V_{DS}=400V V_{GS}=0V I_{SD}=10A di/dt=1.5KA/us	T_j=25℃ T_j=175℃
Q_{rr}	Reverse Recovery Charge	26 46		nC		T_j=25℃ T_j=175℃
t_{rr}	Reverse Recovery time	6.9 6.0		ns		T_j=25℃ T_j=175℃
Err	Reverse Recovery Energy	0.24 0.40		μJ		T_j=25℃ T_j=175℃

Thermal Characteristics (TJ= 25℃ unless otherwise specified)

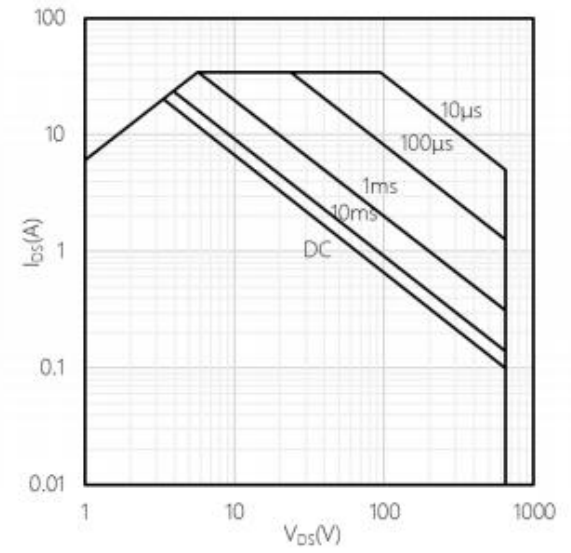
Symbol	Parameter	Typ.	Max.	Unit	Test Conditions
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1.83		℃/W	

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Typical Feature Curve

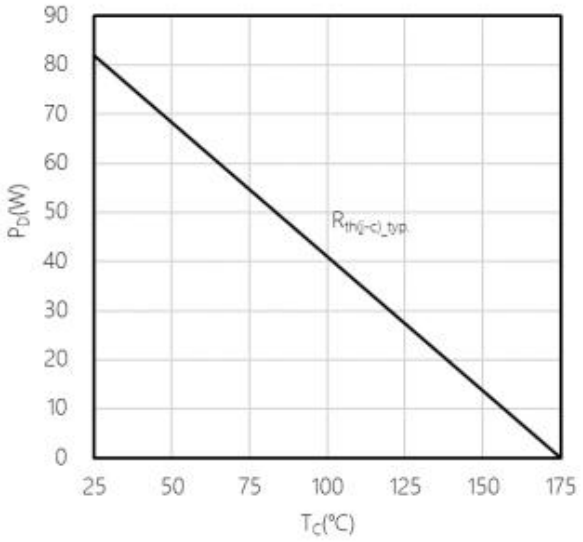
Safe operating area (SOA)

$R_{th(j-c)}$ =2.2 °C/W, Single Pulse, T_{VJ} = 25°C



Power dissipation as a function of case temperature limited by bond wire

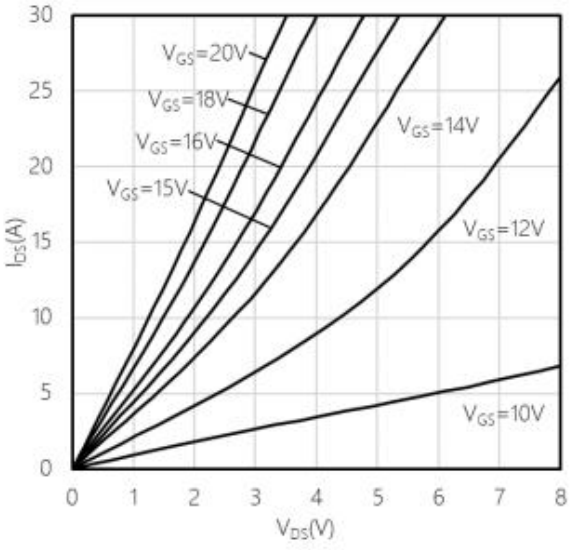
$P_D = f(T_C)$



Typical output characteristic, V_{GS} as parameter

I_{DS}= f(V_{DS})

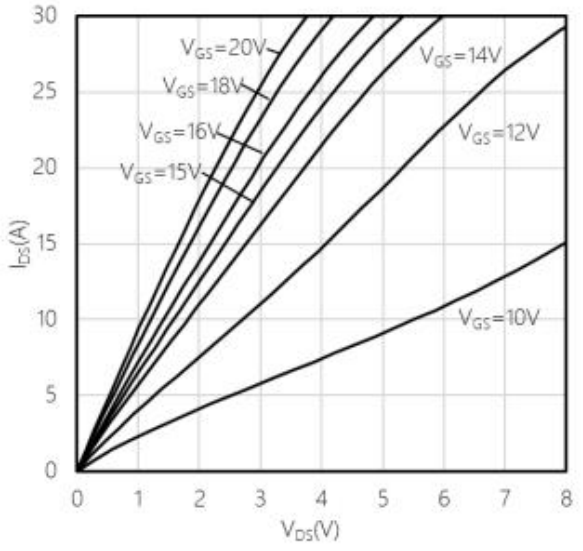
T_{VJ} = -55 °C



Typical output characteristic, V_{GS} as parameter

I_{DS} = f(V_{DS})

T_{VJ} = 25 °C

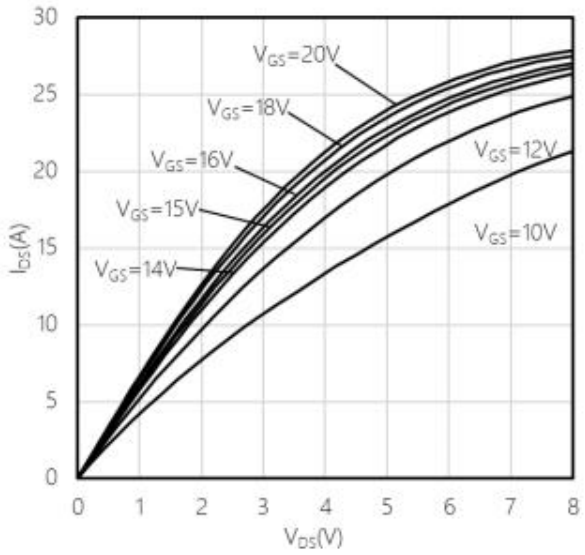


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Typical output characteristic, V_{GS} as parameter

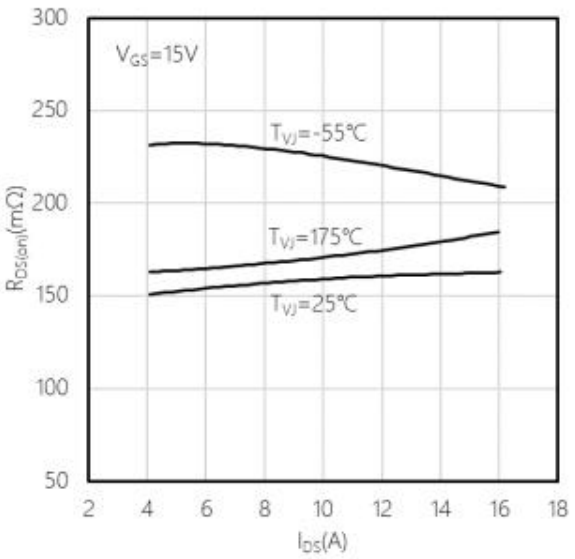
$I_{DS} = f(V_{DS})$

T_{VJ} = 175℃



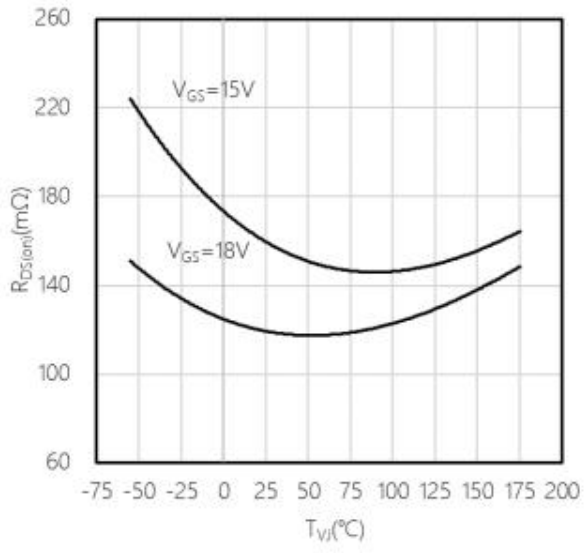
Typical on-state resistance as a function of drain current

$R_{DS(on)} = f(I_{DS})$, V_{GS} = 15V



Typical on-state resistance as a function of temperature

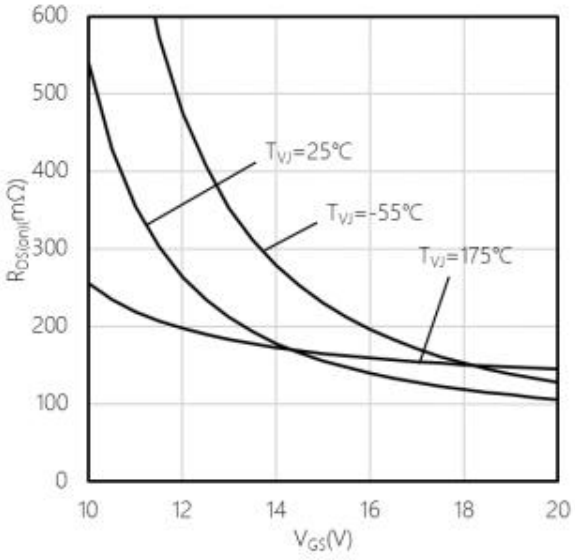
$R_{DS(on)} = f(T_{VJ})$, I_{DS} =10 A



Typical on-state resistance as a function of V_{GS}

$R_{DS(on)} = f(V_{GS})$

I_{DS} =10 A

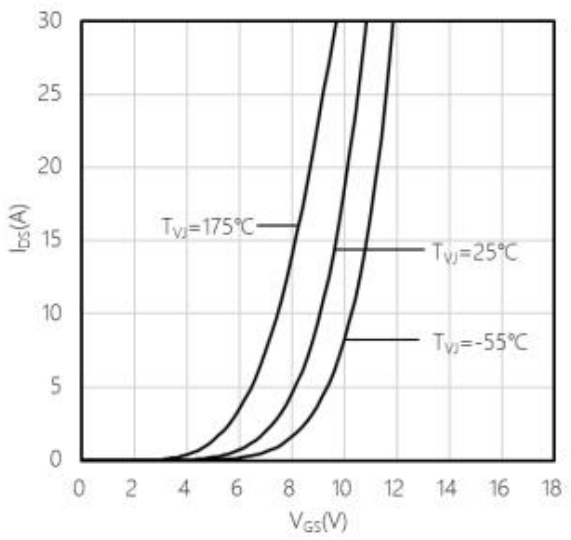


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Typical transfer characteristic

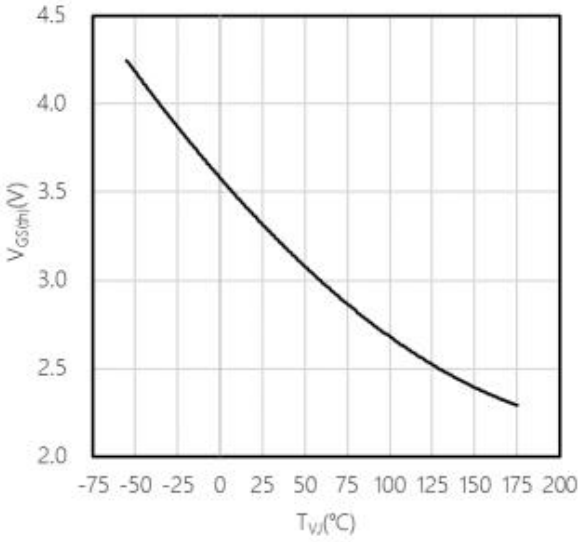
$I_{DS} = f(V_{GS})$

V_{DS}= 20 V



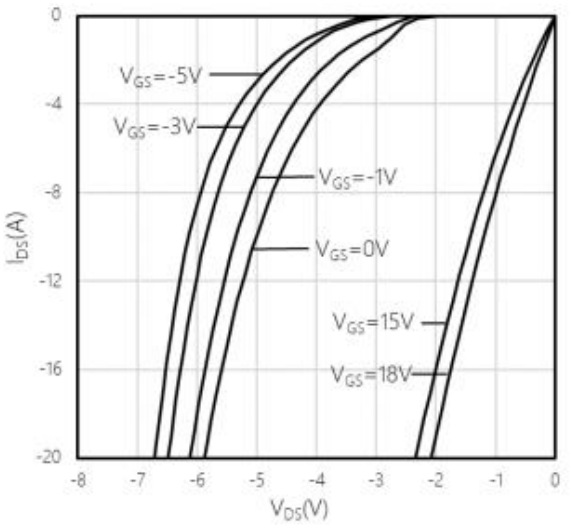
Typical gate-source threshold voltage as a function of junction temperature

$V_{GS(th)} = f(T_{VJ})$, I_{DS} = 3.5 mA



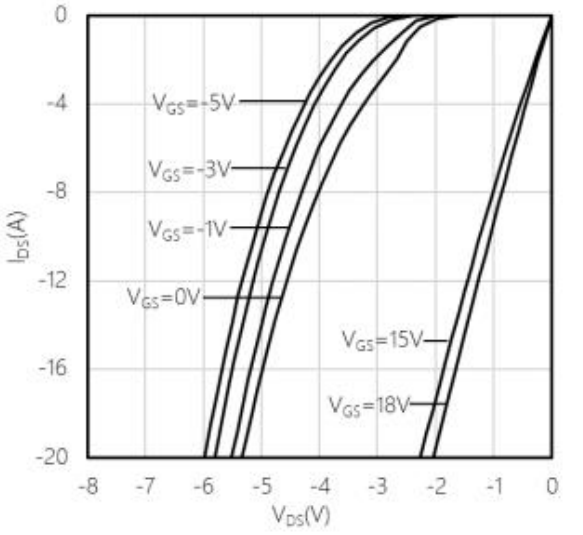
Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter

$I_{DS} = f(V_{DS})$, T_{VJ} = -55 °C



Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter

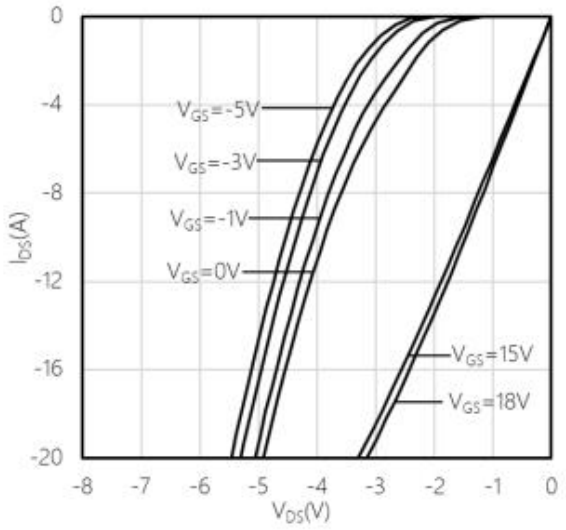
$I_{DS} = f(V_{DS})$, T_{VJ} = 25 °C



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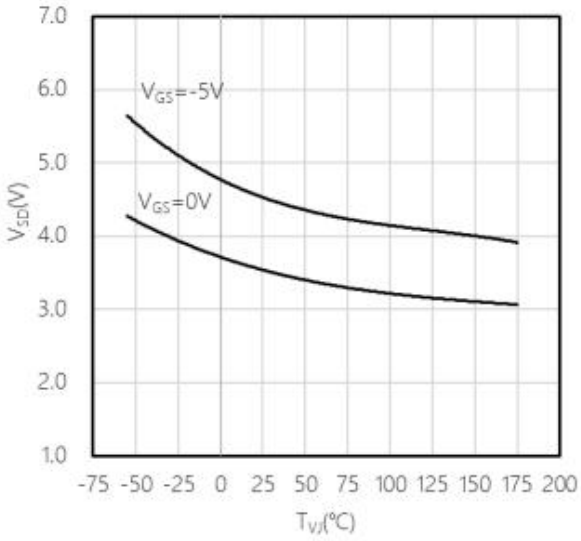
Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter

$I_{DS} = f(V_{DS})$, $T_{VJ} = 175\,°C$



Typical reverse drain voltage as function of junction temperature

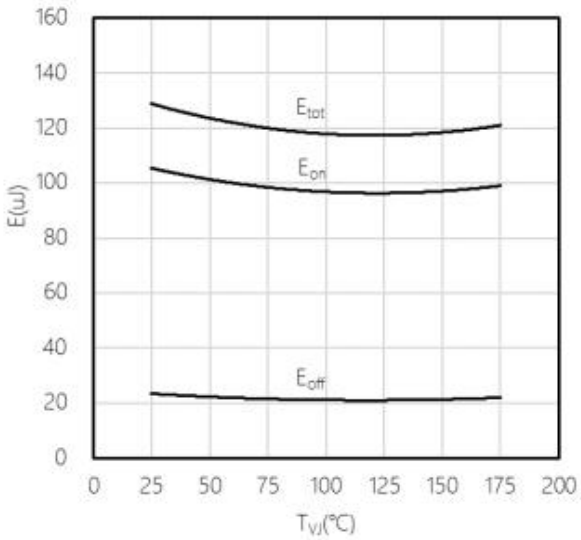
$V_{SD} = f(T_{VJ})$, $I_{SD} = 5\,A$



Typical switching energy as a function of junction temperature, 2nd device own body diode: V_{GS} = -5 V

$E = f(T_{VJ})$

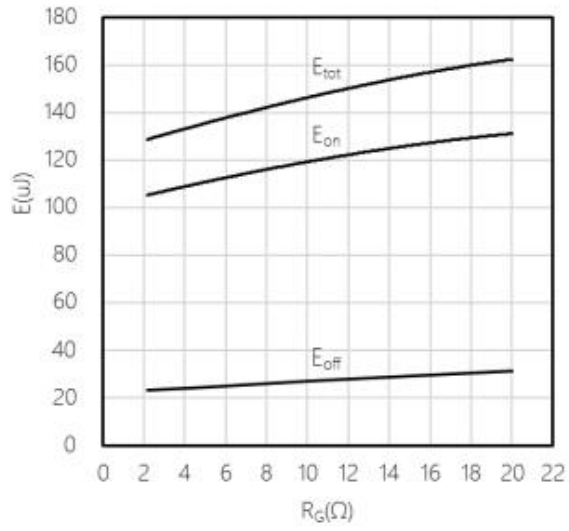
$V_{DS} = 400\,V$, $R_{G(ext)} = 2.2\,\Omega$, $V_{GS} = 0\,V / 15\,V$, $I_{DS} = 10\,A$



Typical switching energy losses as a function of gate resistance, 2nd device own body diode: V_{GS} = -5 V

$E = f(R_{G(ext)})$

$V_{GS} = 0/15\,V$, $I_{DS} = 10\,A$, $T_{VJ} = 25\,°C$, $V_{DS} = 400\,V$

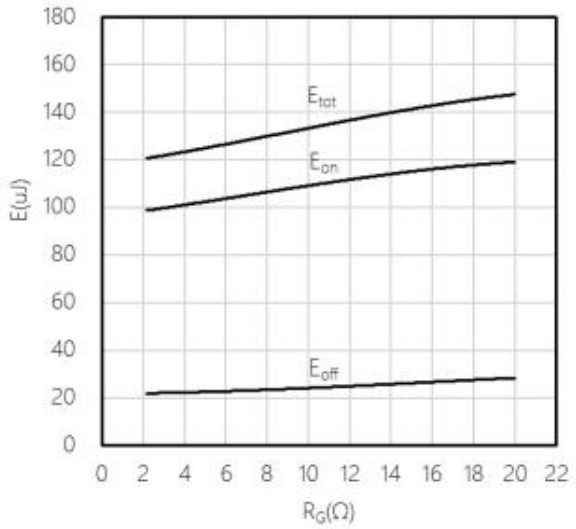


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Typical switching energy losses as a function of gate resistance, 2nd device own body diode: V_{GS} = -5 V

$E = f(R_{G(ext)})$

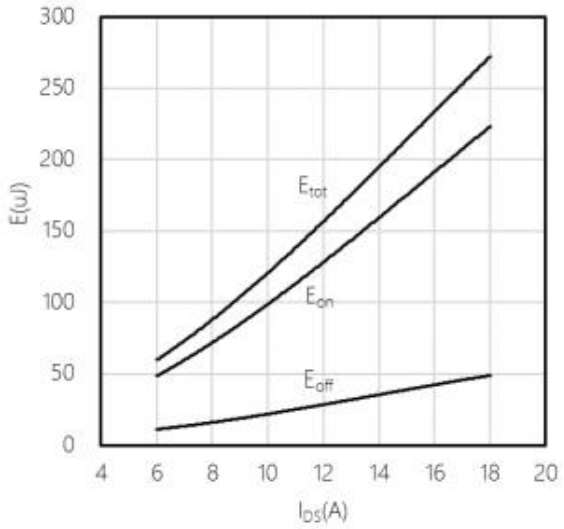
V_{GS} = 0/15 V, I_{DS} = 10 A, T_{VJ} = 175 °C, V_{DS} = 400 V



Typical switching energy losses as a function of I_{DS}, 2nd device own body diode: V_{GS} = -5 V

$E = f(I_{DS})$

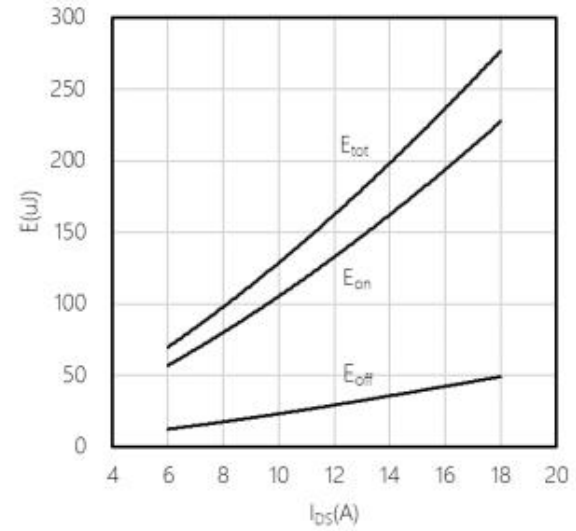
V_{GS} = 0/15 V, $R_{G(ext)}$ = 2.2 Ω, T_{VJ} = 25 °C, V_{DS} = 400 V



Typical switching energy losses as a function of I_{DS}, 2nd device own body diode: V_{GS} = -5 V

$E = f(I_{DS})$

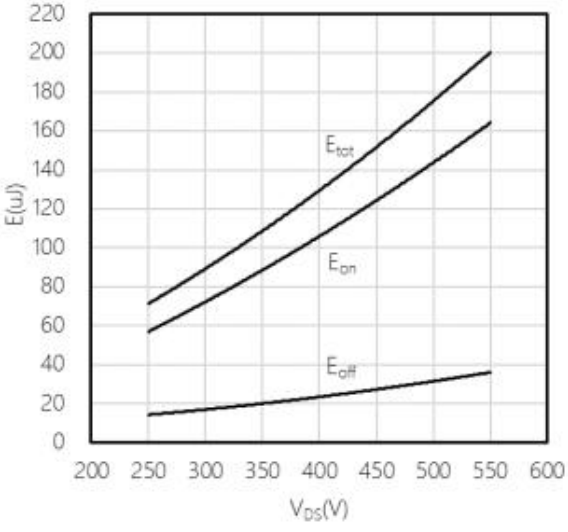
V_{GS} = 0/15 V, $R_{G(ext)}$ = 2.2 Ω, T_{VJ} = 175 °C, V_{DS} = 400 V



Typical switching energy losses as a function of V_{DS}, 2nd device own body diode: V_{GS} = -5 V

$E = f(V_{DS})$

V_{GS} = 0/15 V, $R_{G(ext)}$ = 2.2 Ω, T_{VJ} = 25 °C, I_{DS} = 10 A

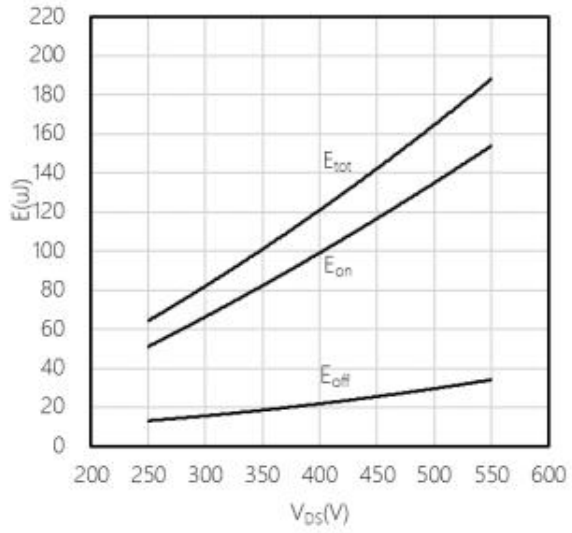


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Typical switching energy losses as a function of V_{DS}, 2nd device own body diode: V_{GS} = -5 V

E = f(V_{DS})

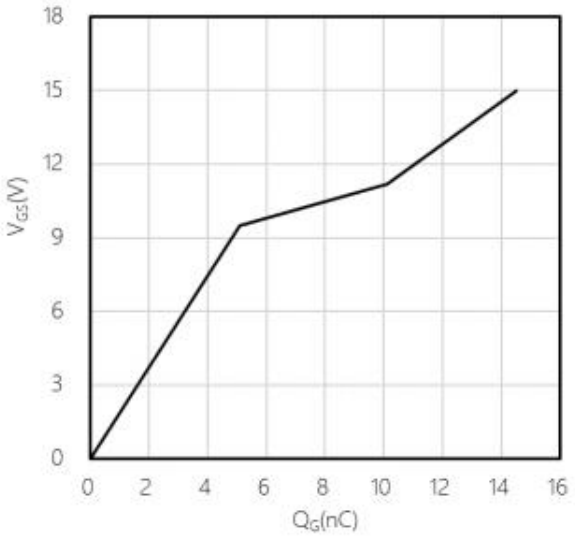
V_{GS} = 0/15 V, $R_{G(ext)}$ = 2.2 Ω, T_{VJ} = 175 °C, I_{DS} = 10 A



Typical gate charge

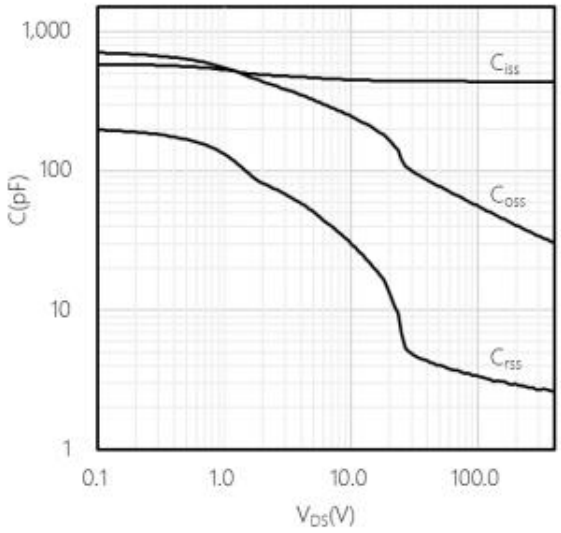
V_{GS} =f(Q_G), I_{DS} = 10 A, V_{DS} = 400V

turn-on pulse



Typical capacitance as a function of drain-source voltage

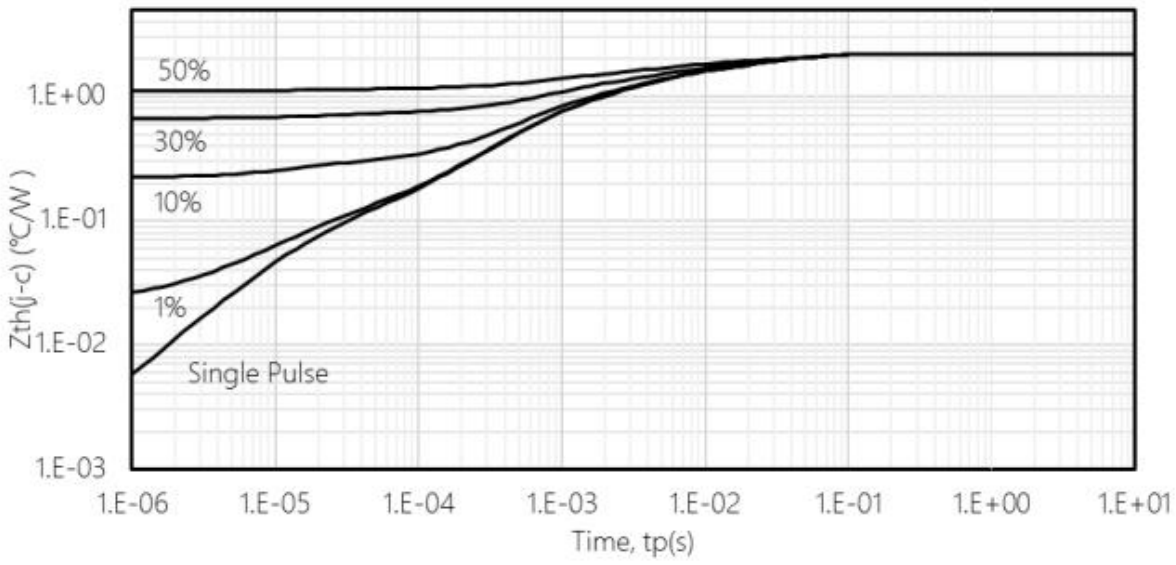
C = f(V_{DS}), V_{GS} = 0V, f = 1MHz



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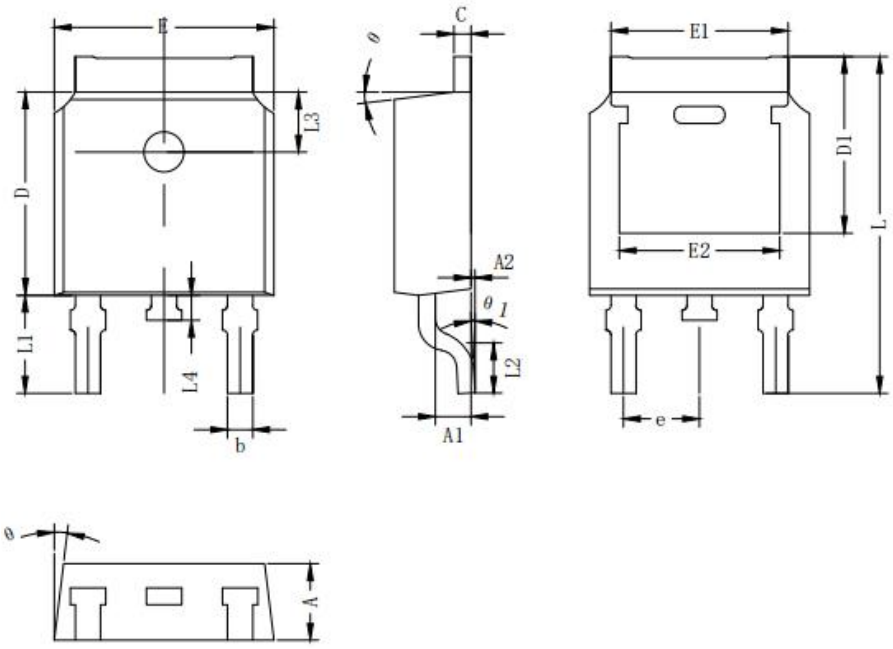
Transient thermal resistance (MOSFET)

($Z_{th(j-c,max)} = f(t_p)$, Parameter $D = t_p/T$



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Package outline drawing(TO-252 Unit: mm)



SYMBOL	MIN	NOM	MAX
A	2.10	2.30	2.50
A1	0.97	1.07	1.17
A2	0.00	–	0.12
b	0.66	0.76	0.86
c	0.45	0.51	0.60
D	5.90	6.10	6.30
D1	5.10	5.30	5.45
E	6.40	6.60	6.80
E1	5.10	5.33	5.45
E2	4.63	4.83	5.03
L	9.90	10.10	10.30
L1	2.74	2.94	3.14
L2	1.40	1.50	1.70
L3	1.65	1.80	1.95
L4	0.60	0.80	1.00
e	2.286BSC		
θ	5°	7°	10°
θ1	0°	–	3°

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c.whose failuer to when properly used in accordance with instructions for used provided in the laeling,can be reasonably expected to result in significant injury to the user.

2.A critical component is any component of a life support device or system whose failure to system whose failure to perform can be reasonably expected to cause the failure of the life support device or system,or to affect its safety or effectiveness.

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