Features

- Effectively lower down T_j and R_{th}, high anti-EMI ability
- High speed switching with low capacitances
- High blocking voltage with low $R_{DS(on)}$
- Easy to drive and parallel
- RoHS compliant

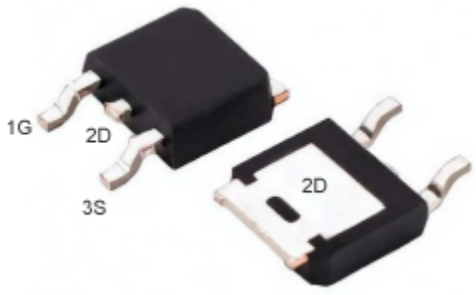
Benefits

- Increased power density
- Higher operating frequency
- Reduced heat sink requirements
- Higher efficiency
- EMI reduction

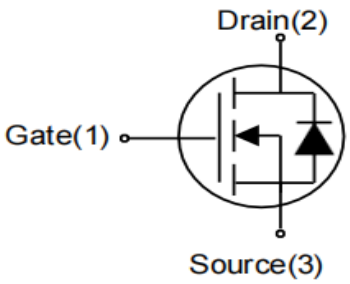
Applications

- Power factor correction modules
- Switch mode power supplies
- Power inverters
- High voltage converters

Parameter	Rating	Units
V_{DS}	**800**	V
$I_{D\ @\ 25°C}$	**8**	A
$R_{DS(on)}$	**500**	mΩ



TO-252 (DPAK) Package



Part Number	Package	Marking
GC3M050065E	TO-252 (DPAK)	GC3M050065

Package Values

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{th(j-c)}$	MOSFET/Body Diode Junction-Case Thermal Resistance		2.63	3.15	K/W	
T_{VJ}, T_{STG}	Operating Junction and Storage Temperature	-55		175	℃	
T_{SOLD}	Soldering Temperature, Wave Soldering only Allowed at Leads 1.6mm from Case for 10s		260		℃	

Maximum Ratings For MOSFET (T_{VJ}= 25˚C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSS}	Drain-Source Voltage	800	V	
I_D	Continuous DC Drain Current for $R_{th(j-c,typ.)}$, Limited by $T_{VJ(max)}$	8	A	T_C = 25 ℃
		6		Tc = 100℃
I_{DM}	Peak Drain Current, tp Limited by $T_{VJ(max)}$	15	A	T_C = 25 ℃
$V_{GS, max}$	Gate-Source Max Voltage	-10/22	V	
$V_{GS, op}$	Gate-Source Operate Voltage	0/15	V	
E_{AS}	Single Pulse Avalanche Energy	13.3	mJ	L=0.5mH, I_{AS}= 7.3A, V_{DD}=50V, V_{GS}=15 V
P_{tot}	Power Dissipation for $R_{th(j-c,typ.)}$	57	W	T_C = 25℃

MOSFET Characteristics (T_{VJ}= 25˚C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test conditions	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	800			V	I_D = 100 μA	
$V_{GS(th)}$	Gate Threshold Voltage	2.9	3.8		V	V_{DS} = V_{GS}, I_D = 3.5 mA	T_{VJ} = 25 ℃
			2.7				T_{VJ} = 175 ℃
I_{DSS}	Drain-Source Leakage Current		0.1	20	μA	V_{GS} = 0 V, V_{DS} = 650 V	T_{VJ} = 25 ℃
			4.0				T_{VJ} = 175 ℃
I_{GSS}	Gate-Source Leakage Current			250	nA	V_{GS} = 22 V, V_{DS} = 0 V	T_{VJ} = 25 ℃
I_{SGS}	Source-Gate Leakage Current			250	nA	V_{GS} = -10 V, V_{DS} = 0 V	T_{VJ} = 25 ℃
$R_{DS(on)}$	Drain-Source On-State Resistance		500	600	mΩ	V_{GS} = 15 V, I_D = 1 A	T_{VJ} = 25 ℃
			456				T_{VJ} = 175 ℃
g_{fs}	Transconductance		2.9		S	V_{DS} = 20 V, I_D = 4 .5A	
$R_{G(int)}$	Internal Gate Resistance		25		Ω	f = 1MHz, V_{AC} = 25 mV	
C_{iss}	Input Capacitance		170		pF	V_{GS} = 0 V, V_{DS} = 400 V, f = 1MHz	
C_{oss}	Output Capacitance		13		pF		
C_{rss}	Reverse Transfer Capacitance		1.3		pF		
Q_{GS}	Gate to Source Charge		3.2		nC	V_{GS} = 0/15 V, V_{DS} = 400 V, I_D = 4.5A	
Q_{GD}	Gate to Drain Charge		1.3		nC		
Q_G	Total Gate Charge		9.0		nC		

Dynamic MOSFET Characteristics (T_{VJ}= 25˚C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test conditions	
$t_{d(on)}$	Turn−On Delay Time		17.0		ns	V_{GS} = 0/15 V, L=600 µH V_{DD} = 400 V, I_D = 4.5 A, $R_{G(on)}$ = 9.1 Ω, $R_{G(off)}$ = 9.1Ω	T_{VJ} = 25 ℃
			14.3				T_{VJ} = 175 ℃
t_r	Rise Time		12.2		ns		T_{VJ} = 25 ℃
			9.3				T_{VJ} = 175 ℃
$t_{d(off)}$	Turn−Off Delay Time		14.5		ns		T_{VJ} = 25 ℃
			16.8				T_{VJ} = 175 ℃
t_f	Fall Time		13.1		ns		T_{VJ} = 25 ℃
			13.0				T_{VJ} = 175 ℃
E_{on}	Turn−On Switching Loss		45.4		µJ		T_{VJ} = 25 ℃
			42.2				T_{VJ} = 175 ℃
E_{off}	Turn−Off Switching Loss		3.86		µJ		T_{VJ} = 25 ℃
			3.40				T_{VJ} = 175 ℃
E_{tot}	Total Switching Energy		49.2		µJ		T_{VJ} = 25 ℃
			45.6				T_{VJ} = 175 ℃

Note: E_{on}/E_{off} result is with body diode.

Maximum Ratings For Body Diode (T_{VJ}= 25˚C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSS}	Drain-Source Voltage	800	V	
I_S	Continuous DC Source Current, Limited by $T_{VJ(max)}$	8	A	T_C = 25 ℃
		6	A	T_C = 100 ℃
I_{SM}	Peak Reverse Drain Current, tp Limited by $T_{VJ(max)}$	23	A	T_C = 25 ℃

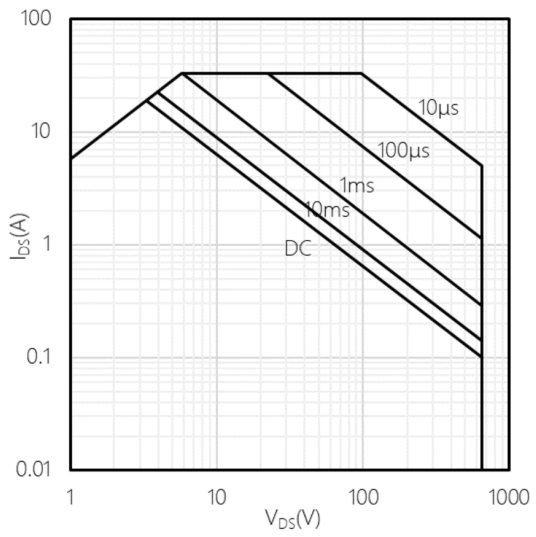
Body Diode Characteristics (T_{VJ}= 25˚C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test conditions	
V_{SD}	Body Diode Forward Voltage		3.8		V	V_{GS} = 0 V, I_{SD} = 2.5 A	T_{VJ} = 25 ℃
			3.2				T_{VJ} = 175 ℃
I_{rrm}	Peak Reverse Recovery Current		4.1		A	V_{DS} = 400 V, V_{GS} = 0 V, I_{SD} =4.5 A, di/dt = 1.1 kA/µs	T_{VJ} = 25 ℃
			4.6				T_{VJ} = 175 ℃
Q_{rr}	Reverse Recovery Charge		23		nC		T_{VJ} = 25 ℃
			27				T_{VJ} = 175 ℃
t_{rr}	Reverse Recovery Time		9.4		ns		T_{VJ} = 25 ℃
			10.1				T_{VJ} = 175 ℃
E_{rr}	Reverse Recovery Energy		0.16		µJ		T_{VJ} = 25 ℃
			0.32				T_{VJ} = 175 ℃

Typical Characteristics

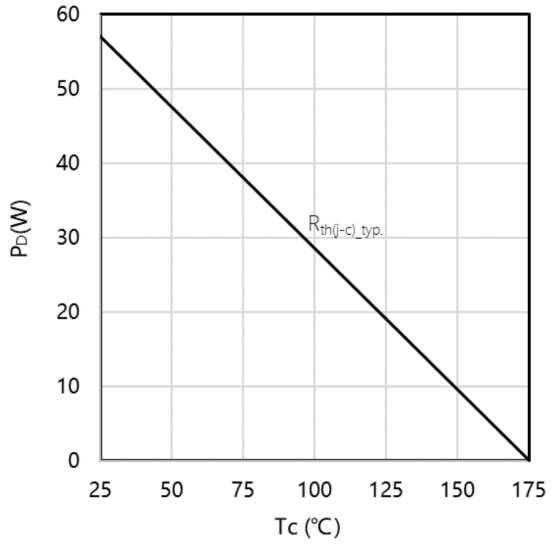
Safe operating area (SOA)

$R_{th(j-c)}$ =3.15 °C/W, Single Pulse, T_{VJ} = 25°C



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

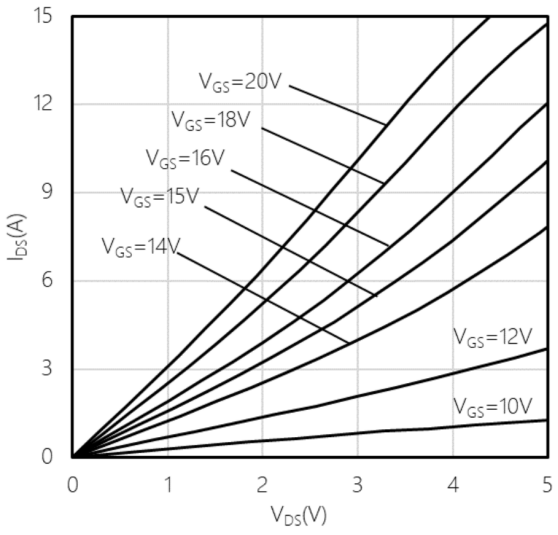
$P_D = f(T_C)$



Typical output characteristic, V_{GS} as parameter

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

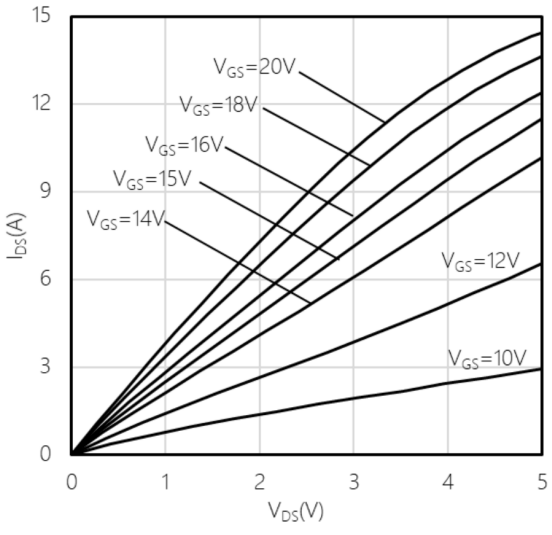
T_{VJ} = -55 ℃



Typical output characteristic, V_{GS} as parameter

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

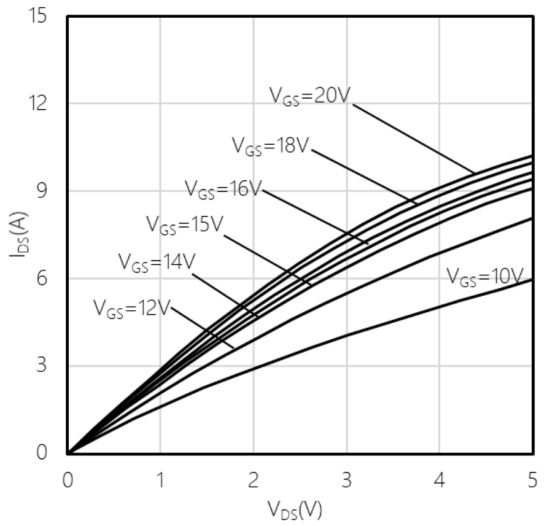
T_{VJ} = 25 ℃



Typical output characteristic, V_{GS} as parameter

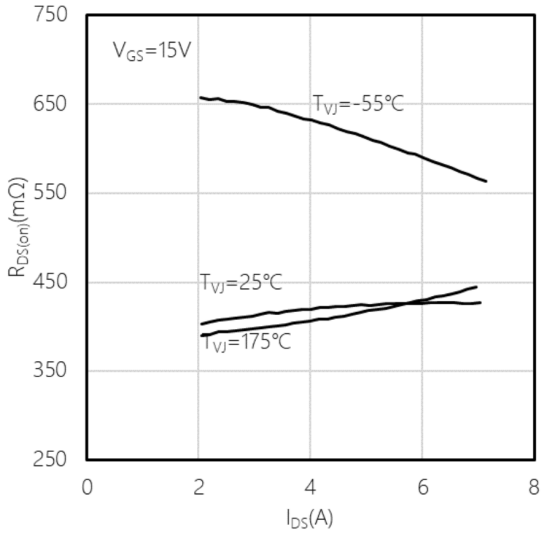
$I_{DS} = f(V_{DS})$

T_{VJ} = 175℃



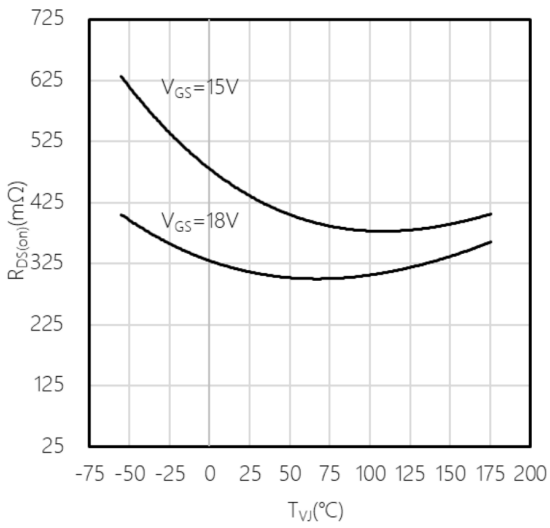
Typical on-state resistance as a function of drain current

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



Typical on-state resistance as a function of temperature

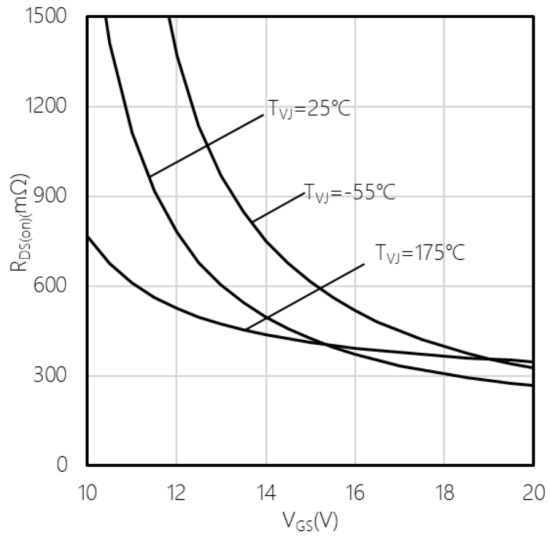
$R_{DS(on)} = f(T_{VJ})$, I_{DS} =4.5 A



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

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

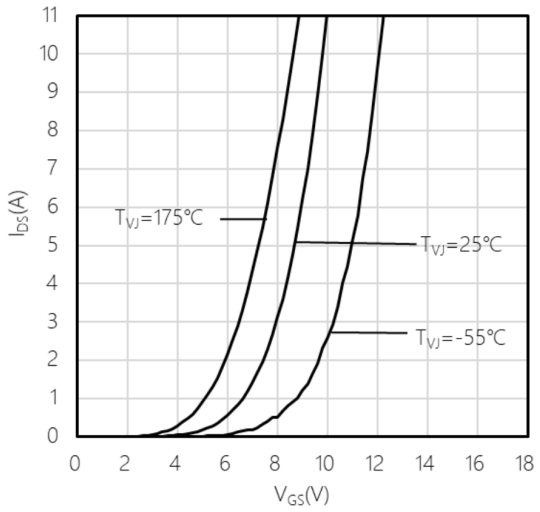
I_{DS} =4.5 A



Typical transfer characteristic

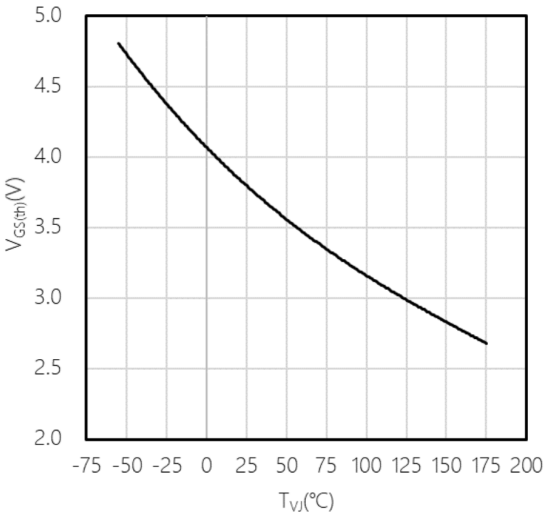
$I_{DS} = f(V_{GS})$

V_{DS}= 20 V



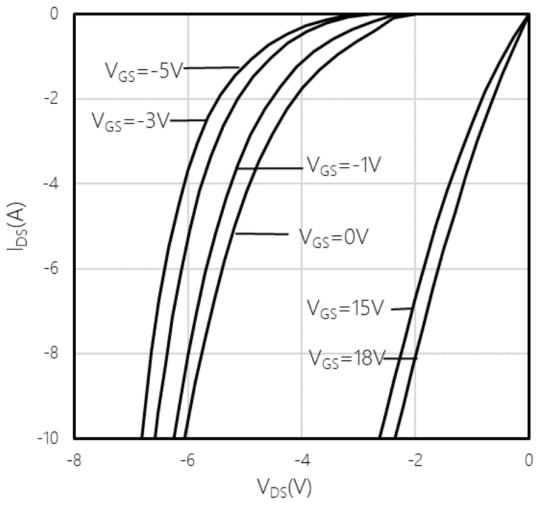
Typical gate-source threshold voltage as a function of junction temperature

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



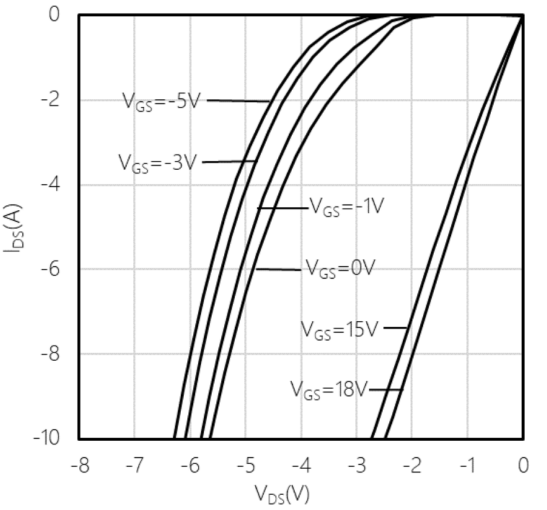
Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter

$I_{DS} = f(V_{DS})$, T_{VJ} = -55 °C



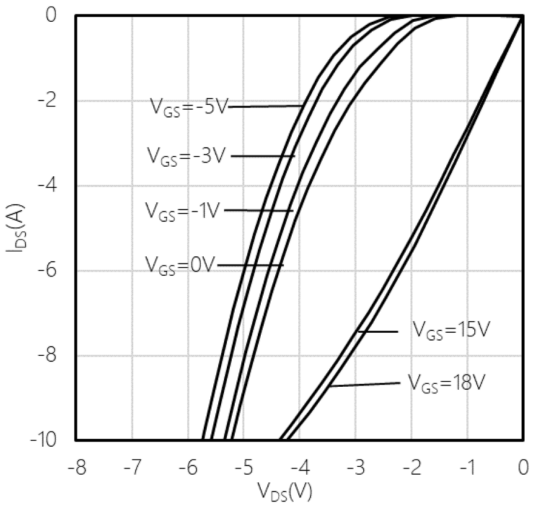
Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter

$I_{DS} = f(V_{DS})$, T_{VJ} = 25 °C



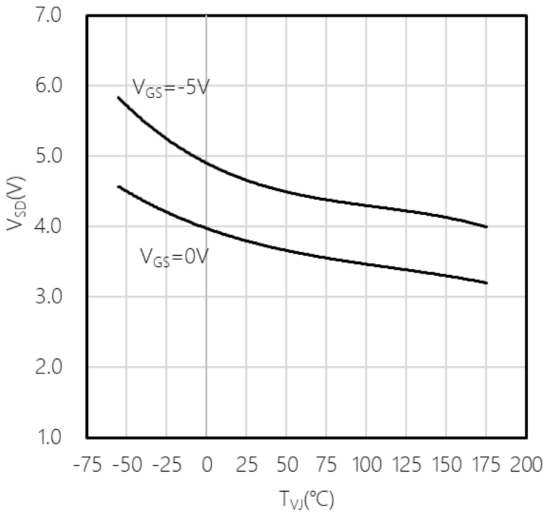
Typical reverse drain current as function of reverse drain voltage, V_{GS} as parameter

$I_{DS} = f(V_{DS})$, T_{VJ} = 175 °C



Typical reverse drain voltage as function of junction temperature

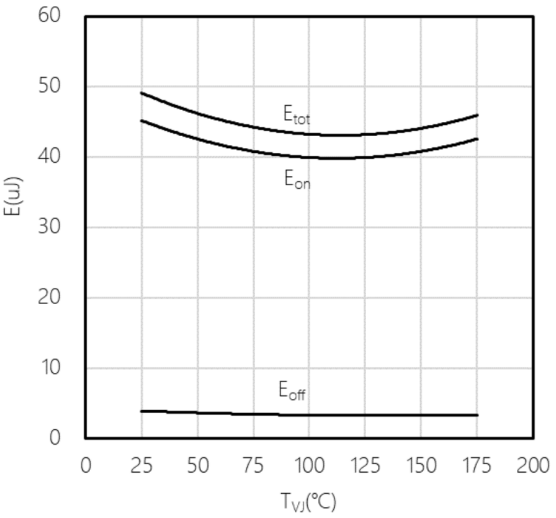
$V_{SD} = f(T_{VJ})$, I_{SD} = 2.5 A



Typical switching energy as a function of junction temperature, 2nd device own body diode: V_{GS} = 0 V

$E = f(T_{VJ})$

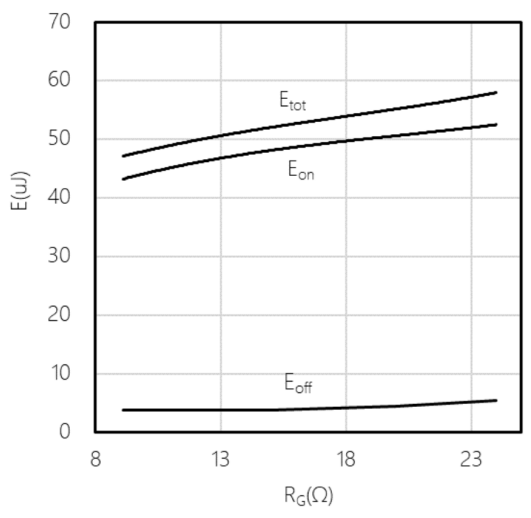
V_{DS} = 400 V, $R_{G(ext)}$ = 9.1 Ω, V_{GS} = 0V / 15 V, I_{DS} = 4.5 A



Typical switching energy losses as a function of gate resistance, 2nd device own body diode: V_{GS} = 0 V

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

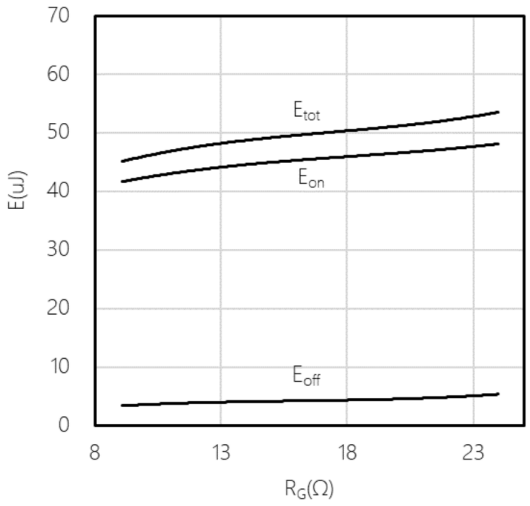
V_{GS} = 0/15 V, I_{DS} = 4.5 A, T_{VJ} = 25 °C, V_{DS} = 400 V



Typical switching energy losses as a function of gate resistance, 2nd device own body diode: V_{GS} = 0 V

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

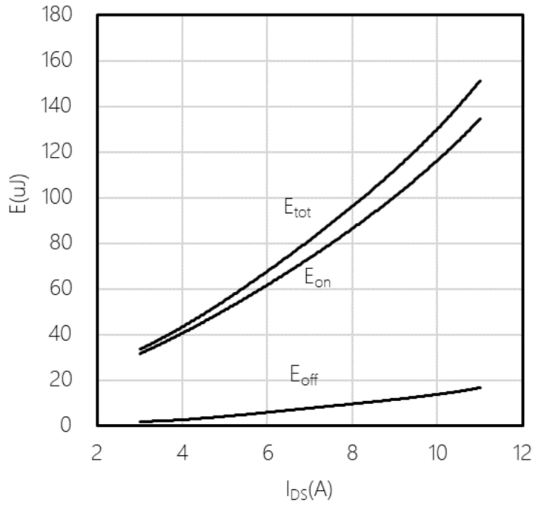
V_{GS} = 0/15 V, I_{DS} = 4 .5A, T_{VJ} = 175 °C, V_{DS} = 400 V



Typical switching energy losses as a function of I_{DS}, 2nd device own body diode: V_{GS} = 0 V

E = f(I_{DS})

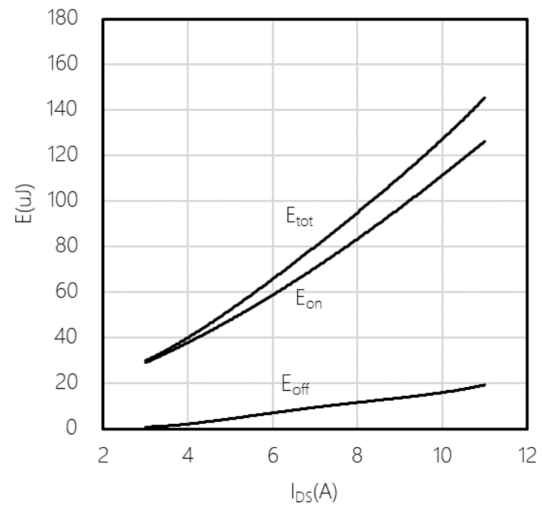
V_{GS} = 0/15 V, $R_{G(ext)}$ = 9.1 Ω, T_{VJ} = 25 °C, V_{DS} = 400 V



Typical switching energy losses as a function of I_{DS}, 2nd device own body diode: V_{GS} = 0 V

E = f(I_{DS})

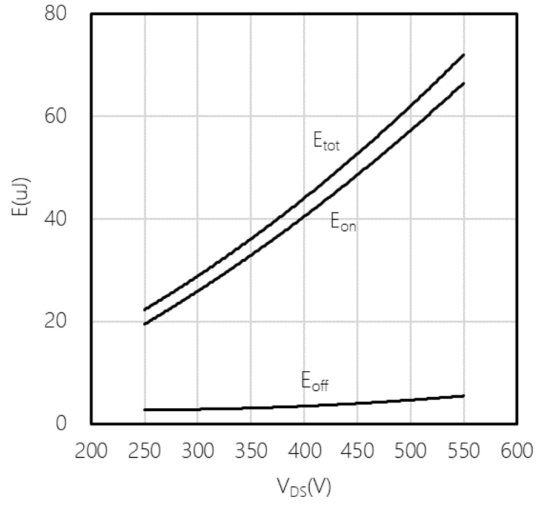
V_{GS} = 0/15 V, $R_{G(ext)}$ = 9.1 Ω, T_{VJ} = 175 °C, V_{DS} = 400 V



Typical switching energy losses as a function of V_{DS}, 2nd device own body diode: V_{GS} = 0 V

E = f(V_{DS})

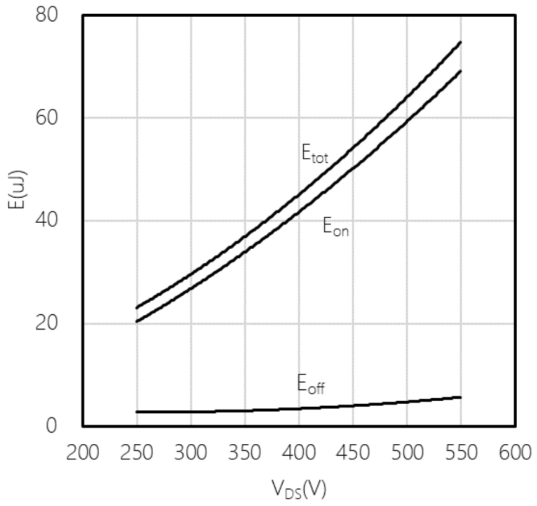
V_{GS} = 0/15 V, $R_{G(ext)}$ = 9.1 Ω, T_{VJ} = 25 °C, I_{DS} = 4.5 A



Typical switching energy losses as a function of V_{DS}, 2nd device own body diode: V_{GS} = 0 V

$E = f(V_{DS})$

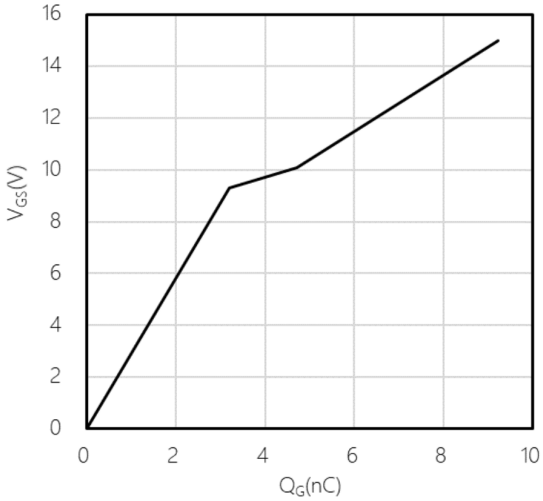
V_{GS} = 0/15 V, $R_{G(ext)}$ = 9.1 Ω, T_{VJ} = 175 °C, I_{DS} = 4.5 A



Typical gate charge

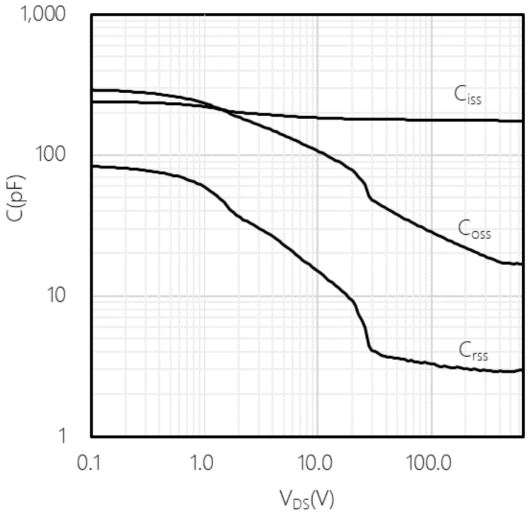
$V_{GS} = f(Q_G)$, I_{DS} = 4.5A, V_{DS} = 400V

turn-on pulse



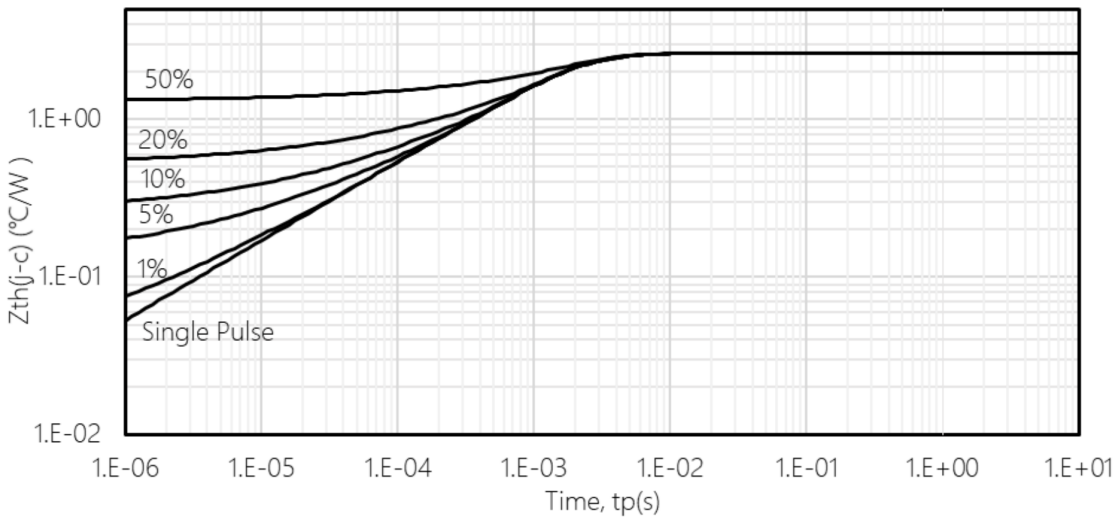
Typical capacitance as a function of drain-source voltage

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

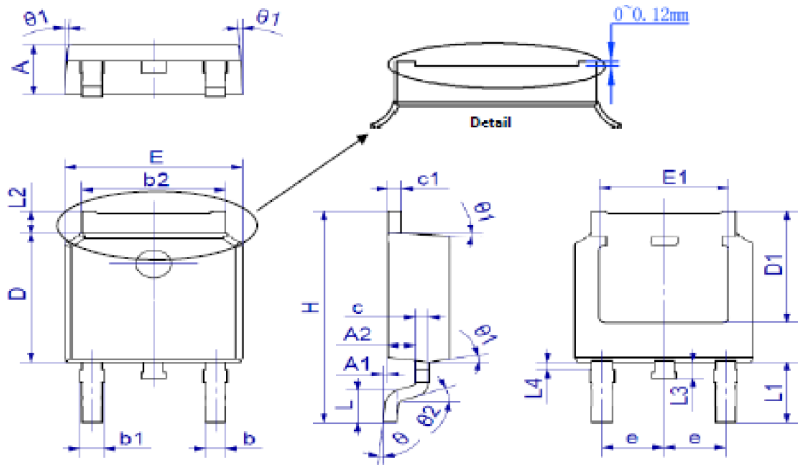


Transient thermal resistance (MOSFET)

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



Package Outline Dimension: TO-252 (DPAK)



Symbols	Dimensions			
	Mm		Inch	
	MIN.	MAX.	MIN.	MAX.
A	2.10	2.50	0.083	0.098
A1	0	0.15	0.000	0.006
A2	0.76	1.36	0.030	0.054
b	0.61	0.85	0.024	0.033
b1	0.71	0.91	0.028	0.036
b2	5.04	5.64	0.198	0.222
c	0.508 TYP.		0.02 TYP.	
c1	0.508 TYP.		0.02 TYP.	
D	5.8	6.3	0.228	0.248
D1	5	5.6	0.197	0.220
E	6.3	6.9	0.248	0.272
E1	4.55	5.15	0.179	0.203
e	2.286 TYP.		0.09 TYP.	
H	9.65	10.4	0.380	0.409
L	1.4	1.7	0.055	0.067
L1	2.90 REF.		0.114 REF.	
L2	0.75	1.35	0.030	0.053
L3	0.6	1.2	0.024	0.047
θ	0°	10°	0°	10°
θ1	5°	9°	5°	9°
θ2	25° REF.		25° REF.	

Revision History

Revision	Date of Release	Description of Changes
V0.1	0.1 2026	Datasheet_V.1.28