


**General description**

Symbol	Value
$V_{DSS}$ @ $T_C=25^\circ\text{C}$	Min 650V
$I_D$ @ $T_C=25^\circ\text{C}$	18.5A
$R_{DS(on)}$	Typ 200mΩ
$Q_G$	Typ 43nC


**Features**

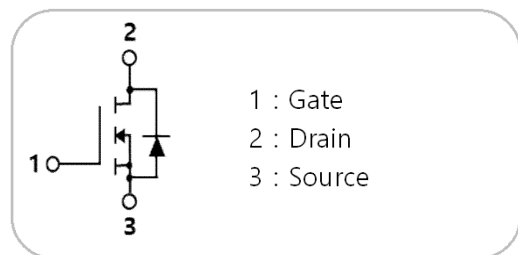
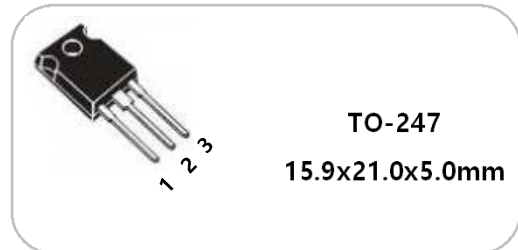
- High blocking voltage with low on-resistance
- 175°C maximum operating temperature
- Fast switching speed
- Fast reverse recovery


**Applications**

- DC/DC converters
- High voltage quick charger (EV)
- Solar inverters
- UPS
- Induction heating
- Motor drives


**Maximum ratings ( $T_C = 25^\circ\text{C}$ )**

Parameter	Symbol	Test condition	Value	Unit
Drain - source voltage	$V_{DSS}$	$T_C=25^\circ\text{C}$	650	V
Gate - source voltage	$V_{GS}$	-	-5 / +20	V
Continuous drain current	$I_D$	$V_{GS}=20\text{V}, T_C=25^\circ\text{C}$	18.5	A
		$V_{GS}=20\text{V}, T_C=100^\circ\text{C}$	12.5	A
Pulsed drain current	$I_{D(pulse)}$	Pulse width $t_p$ limited by $T_{j,max}$	34	A
Power dissipation	$P_D$	$T_C=25^\circ\text{C}$	100	W
Operating and storage temperature range	$T_{j}, T_{stg}$	-	-55 to 175	$^\circ\text{C}$


**Package**



**Electrical characteristics ( $T_C = 25^\circ\text{C}$ )**

Parameter	Symbol	Test condition	Value			Unit
			Min	Typ	Max	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=100\mu A$	650	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0, T_C=25^\circ\text{C}$	-	1	200	$\mu A$
		$V_{DS}=650V, V_{GS}=0, T_C=175^\circ\text{C}$	-	20	-	$\mu A$
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20V, V_{DS}=0V$	-	-	200	nA
		$V_{GS}=-5V, V_{DS}=0V$	-	-	200	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=10V, I_D=5mA$	-	2.6	-	V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=20V, I_D=6A$	-	200	260	mΩ
Gate input resistance	$R_G$	$f = 1\text{MHz}$ , open drain	-	4	-	Ω
Trans conductance	$g_{fs}$	$V_{DS}=17V, I_D=15A$	-	4.5	-	S
Input capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=400V, f = 1\text{MHz}$	-	500	-	pF
Output capacitance	$C_{oss}$		-	60	-	
Reverse transfer capacitance	$C_{rss}$		-	10	-	
Effective output capacitance, energy related	$C_{o(er)}$	$V_{GS}=0V, V_{DS}=0 \text{ to } 400V$	-	75	-	pF
Gate-source charge	$Q_{GS}$	$V_{DS}=400V, V_{GS}=-5/+20V, I_D=5A$	-	10	-	nC
Gate-drain charge	$Q_{GD}$		-	19	-	
Total gate charge	$Q_G$		-	43	-	
Turn on delay time	$t_{d(on)}$	$V_{DS}=400V, V_{GS}=-4/+20V, I_D=5A, R_L=80\Omega, R_{G(ext)}=2.7\Omega$	-	15	-	ns
Rise time	$t_r$		-	17	-	
Turn off delay time	$t_{d(off)}$		-	17	-	
Fall time	$t_f$		-	20	-	
Turn-on switching energy	$E_{on}$	$V_{DS}=400V, V_{GS}=0/20V, I_D=6A, R_{G(ext)}=2.7\Omega$	-	3*	-	μJ
Turn-off switching energy	$E_{off}$		-	4*	-	

\* Based on the results of calculation, note that the energy loss caused by the reverse recovery of free-wheeling diode is not included in  $E_{on}$

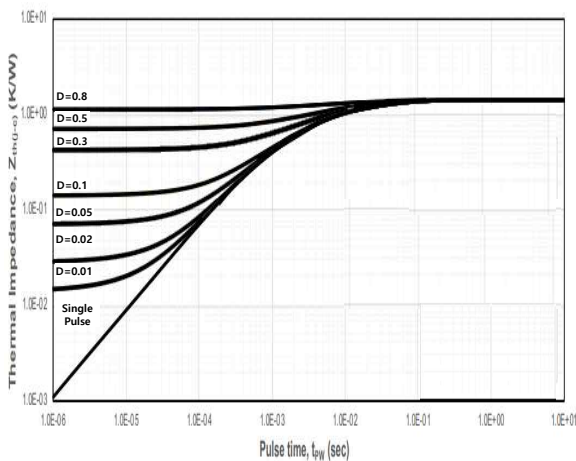
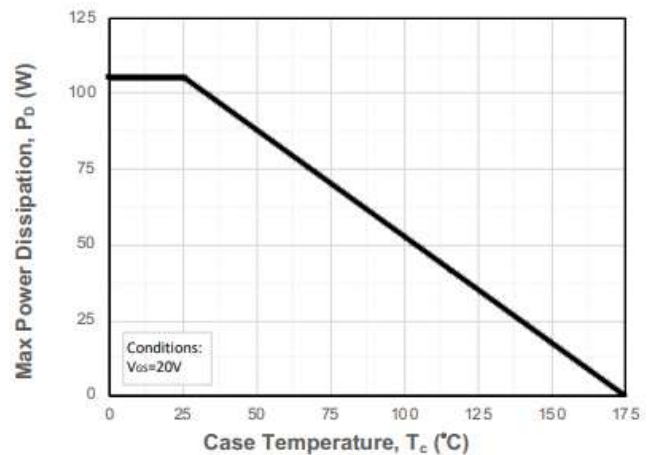
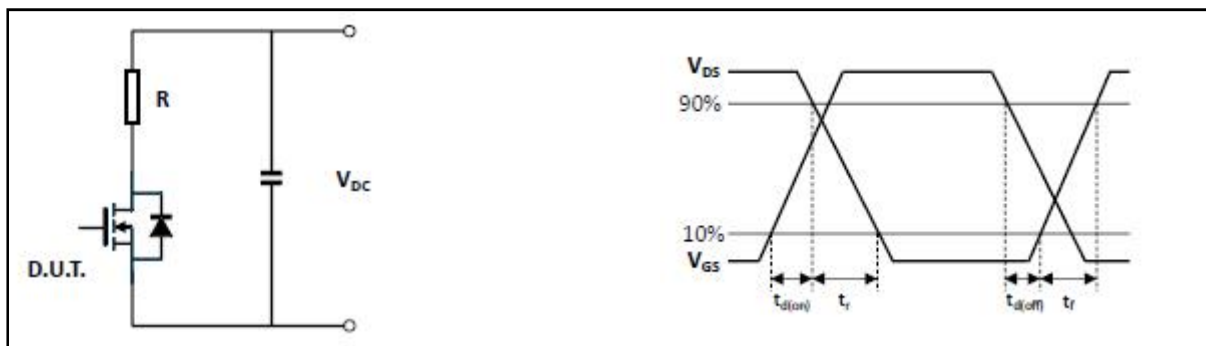


**Body diode(source – drain) electrical characteristics ( $T_C = 25^\circ\text{C}$ )**

Parameter	Symbol	Test condition	Value			Unit
			Min	Typ	Max	
Forward voltage	$V_{SD}$	$V_{GS}=0\text{V}, I_{SD}=2\text{A}$	-	3.5	-	V
Continuous diode Forward current	$I_S$	$V_{GS}=-5\text{V}, T_C=25^\circ\text{C}$	-	15	-	A
Reverse recovery time	$T_{rr}$	$V_{GS}=0\text{V}, I_S=5\text{A}, V_{DS}=400\text{V}, di/dt=300\text{A}/\mu\text{s}$	-	50	-	ns
Reverse recovery charge	$Q_{rr}$		-	35	-	nC
Peak reverse Recovery current	$I_{rrm}$		-	1.8	-	A

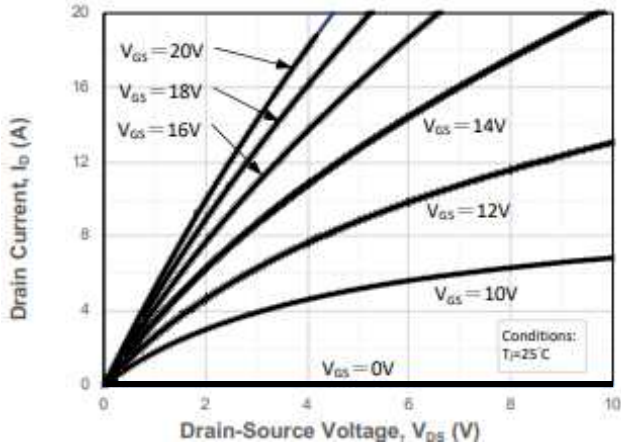
**Thermal characteristics ( $T_C = 25^\circ\text{C}$ )**

Symbol	Parameter	Typ	Max	Unit
$R_{th(j-c)}$	Junction to case	1.45	-	$^\circ\text{C}/\text{W}$

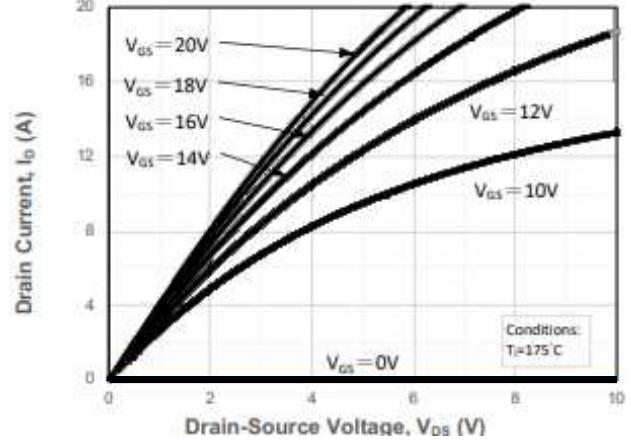
 $t_p - Z_{thjc}$  Characteristics

 $T_C - P_{tot}$  Characteristics

**Typical Device Performance**


**Typical electrical characteristics curves ( $T_C = 25^\circ\text{C}$ )**

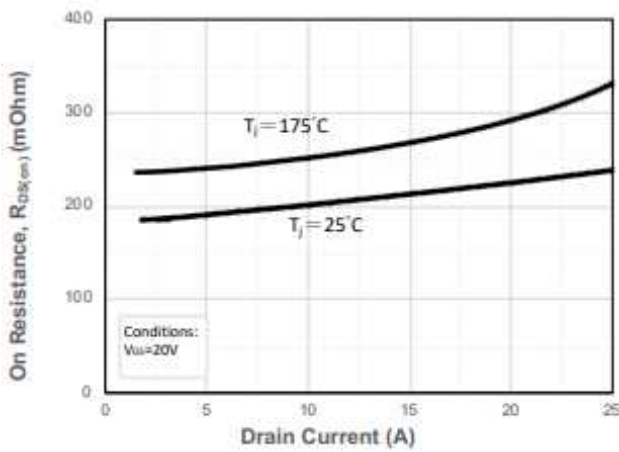
$V_{DS} - I_D$  Characteristics,  $T_J = 25^\circ\text{C}$



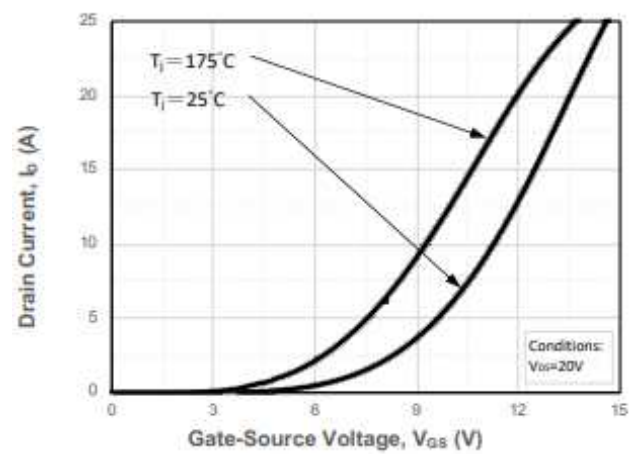
$V_{DS} - I_D$  Characteristics,  $T_J = 175^\circ\text{C}$



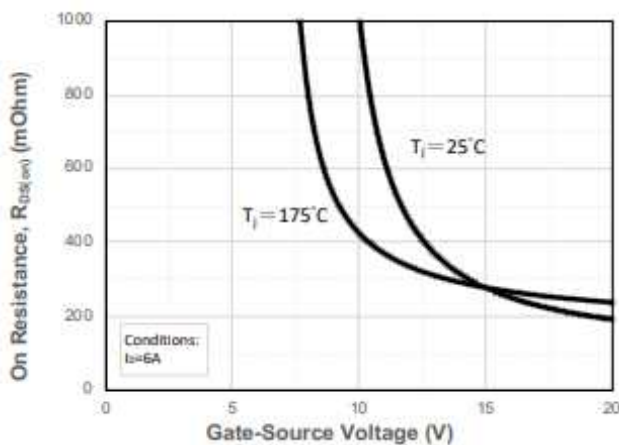
$I_D - R_{DS(on)}$  Characteristics



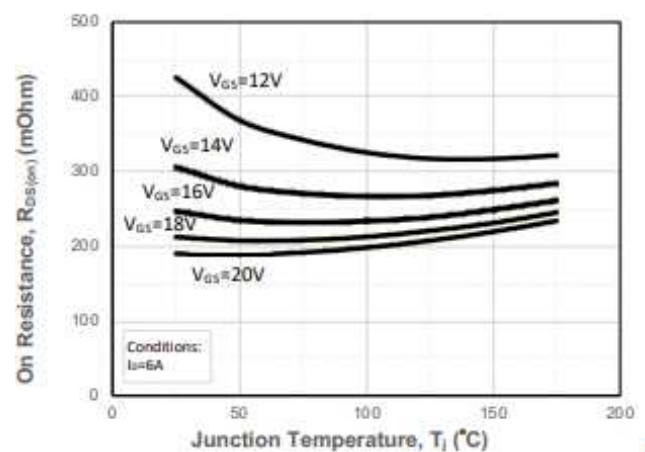
$V_{GS} - I_D$  Characteristics



$V_{GS} - R_{DS(on)}$  Characteristics

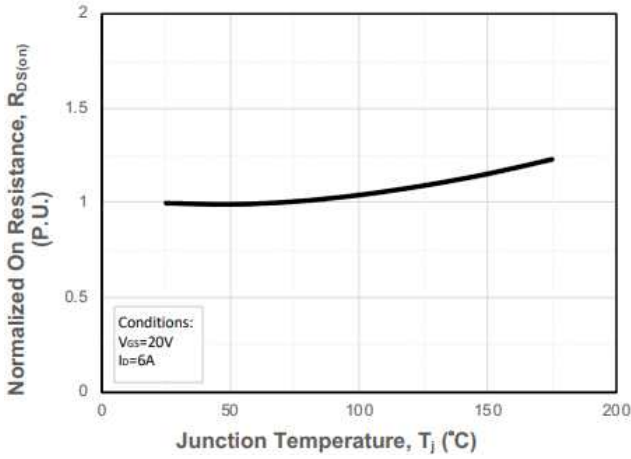


$T_J - R_{DS(on)}$  Characteristics

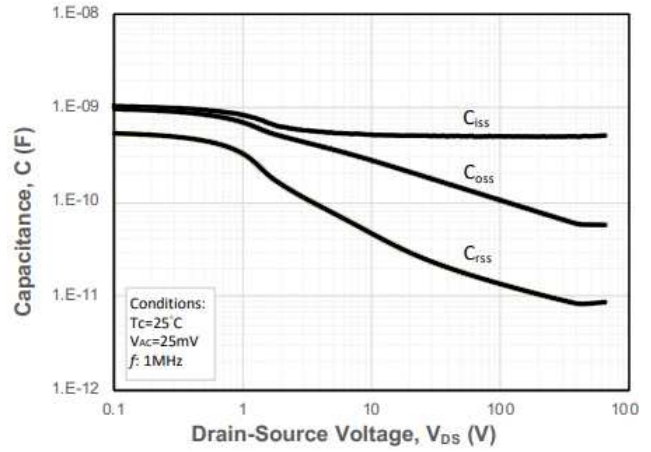


**Typical electrical characteristics curves ( $T_C = 25^\circ\text{C}$ )**

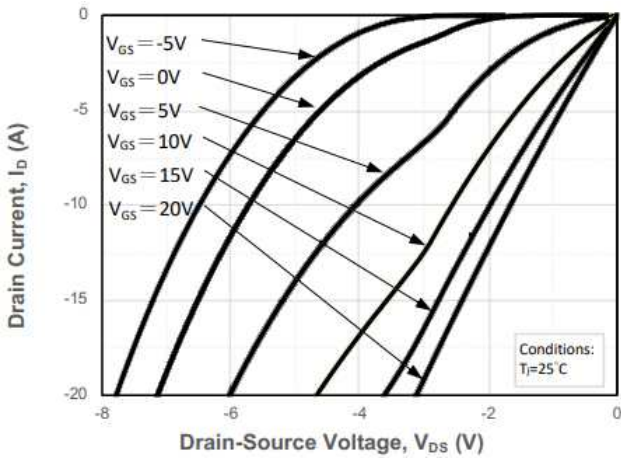
$T_j - R_{DS(on)}$  Characteristics



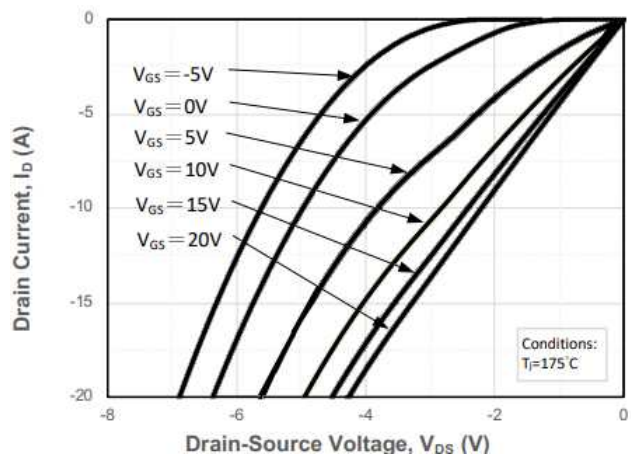
$V_{DS} - C$  Characteristics



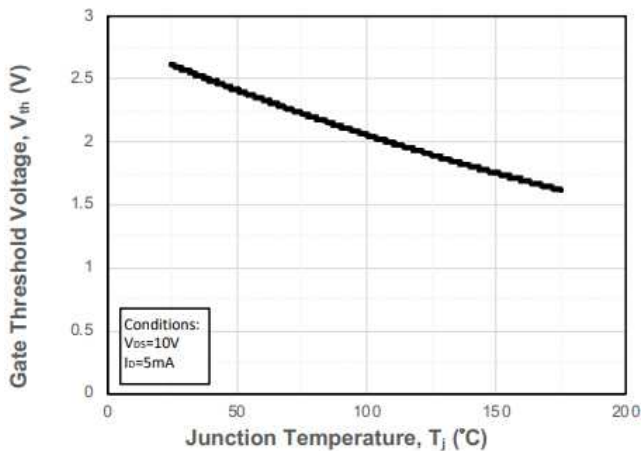
$V_{DS} - I_D$  Characteristics,  $T_j=25^\circ\text{C}$



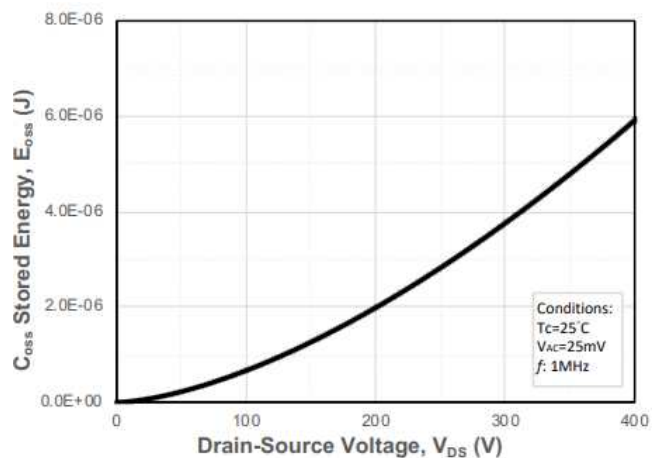
$V_{DS} - I_D$  Characteristics,  $T_j=175^\circ\text{C}$



$T_j - V_{th}$  Characteristics

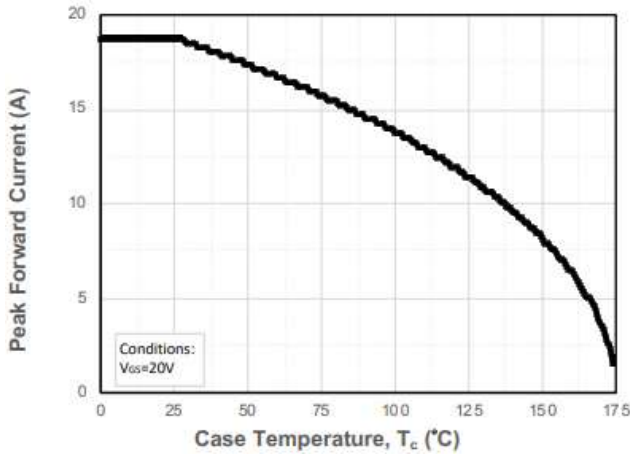


$V_{DS} - E_{oss}$  Characteristics

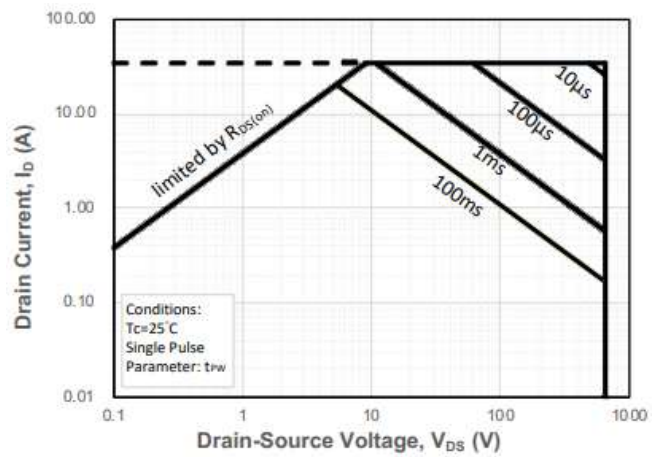


Typical electrical characteristics curves ( $T_C = 25^\circ\text{C}$ )

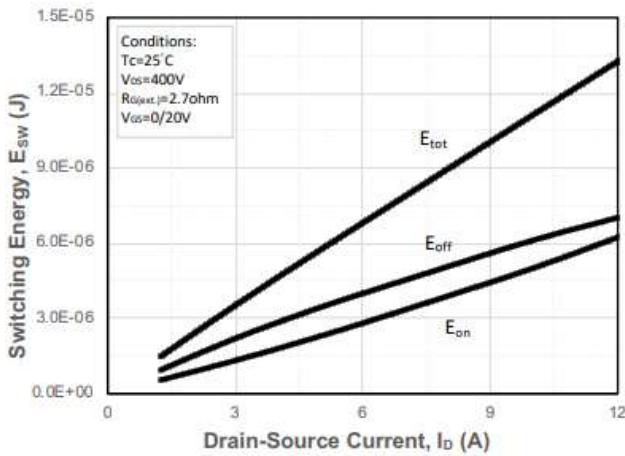
$T_C - I_S$  Characteristics



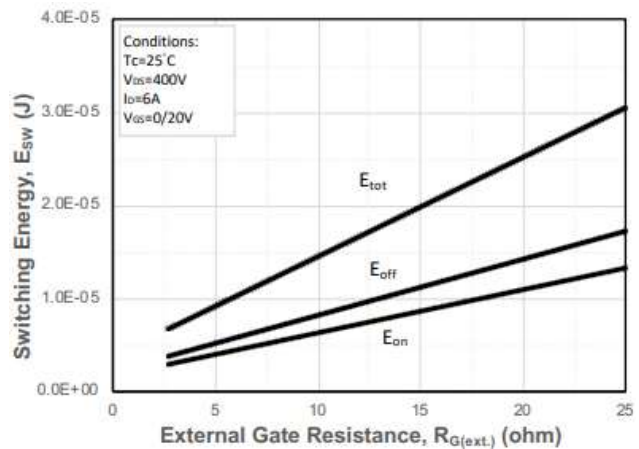
Safe Operating Area (SOA)



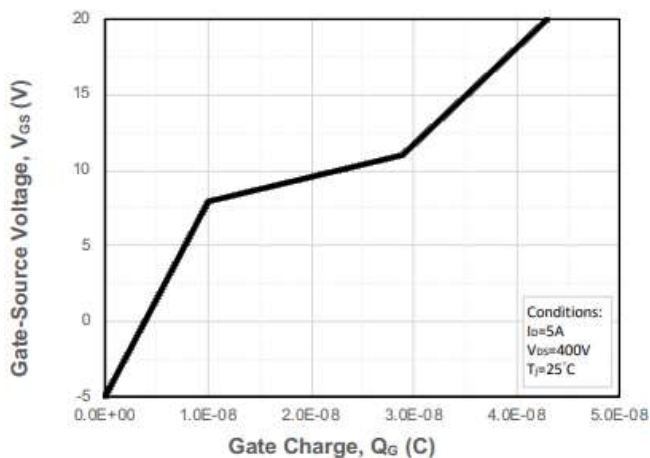
$I_D - E_{SW}$  Characteristics



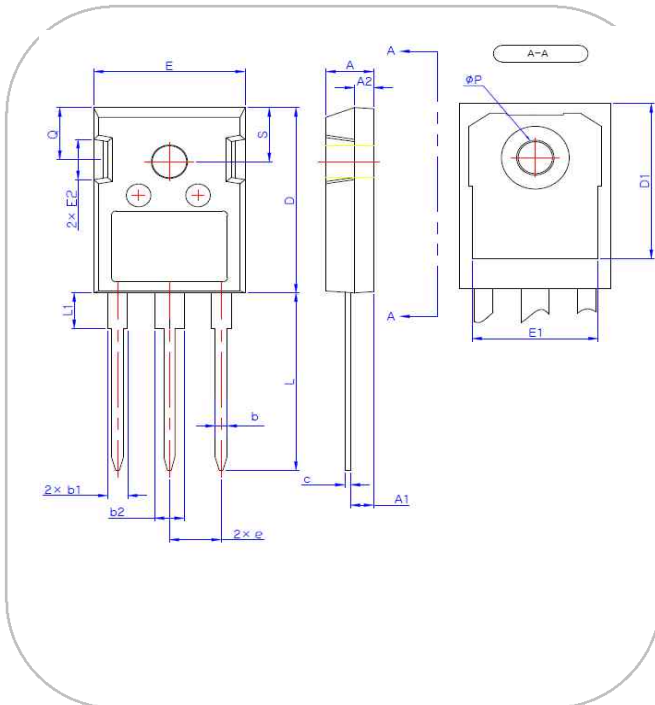
$R_{G(ext)} - E_{SW}$  Characteristics



$Q_G - V_{GS}$  Characteristics



**Package dimensions (TO-247)**



Symbol	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.29	2.36	2.54
A2	1.90	2.00	2.10
b	1.10	1.20	1.30
b1	1.91	2.11	2.20
b2	2.92	3.10	3.20
c	0.50	0.60	0.70
D	20.80	21.07	21.34
D1	17.43	17.63	17.83
E	15.75	15.94	16.13
E1	13.06	13.26	13.46
E2	4.32	4.58	4.83
e	5.45 BSC		
L	19.85	20.00	20.25
L1	-	-	4.49
ΦP	3.55	3.60	3.65
Q	5.59	5.89	6.19
S	6.15 BSC		

**Marking information**

