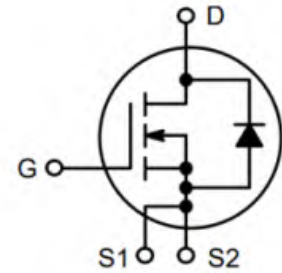


### Features

- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Low Switching Losses
- Sense pin for optimized switching performance
- RoHS compliant with Halogen-free
- Qualified to AEC-Q101 Standards

HF

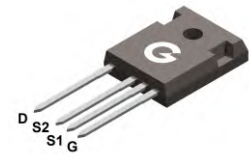


### Applications

- Solar inverters
- Charger
- Uninterruptible Power Supply
- Switch Mode Power Supplies

### Mechanical Data

- Case: TO-247-4L
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



TO-247-4L

### Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TGSC120R060U4	TO-247-4L	30 pcs / Tube	GSC120R060U4

### Maximum Ratings (@ T<sub>C</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V <sub>DSS</sub>	1200	V
Gate-to-Source Voltage (transient)	V <sub>GSS</sub>	-10/+22	V
Gate-to-Source Voltage (static)		-5/+18	V
Continuous Drain Current (T <sub>C</sub> = 25°C)	I <sub>D</sub>	40	A
Continuous Drain Current (T <sub>C</sub> = 100°C)		28	A
Pulsed Drain Current	I <sub>DM</sub>	134	A
Single Pulse Avalanche Energy <sup>2</sup>	E <sub>AS</sub>	180	mJ
Power Dissipation (T <sub>C</sub> = 25°C)	P <sub>D</sub>	238	W
Operating Junction Temperature Range	T <sub>J</sub>	-55 ~ +175	°C
Storage Temperature Range	T <sub>STG</sub>	-55 ~ +175	°C

### Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	R <sub>θJC</sub>	-	-	0.63	°C/W
Thermal Resistance Junction-to-Air	R <sub>θJA</sub>	-	-	40	°C/W

### Electrical Characteristics (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
$V_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 100\mu A$	1200	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 1200V, V_{GS} = 0V$	-	-	10	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS} = 22V, V_{DS} = 0V$	-	-	100	nA
		$V_{GS} = -10V, V_{DS} = 0V$	-	-	-100	nA
<b>On Characteristics</b>						
$R_{DS(ON)}$	Drain-Source On-resistance *1	$V_{GS} = 18V, I_D = 15A, T_J = 25^\circ\text{C}$	-	60	75	m $\Omega$
		$V_{GS} = 18V, I_D = 15A, T_J = 175^\circ\text{C}$	-	90	-	
		$V_{GS} = 15V, I_D = 15A, T_J = 25^\circ\text{C}$	-	75	100	
		$V_{GS} = 15V, I_D = 15A, T_J = 175^\circ\text{C}$	-	95	-	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 5mA$	2.1	-	3.5	V
$R_G$	Gate Resistance	$V_{GS} = 0V, f = 1MHz$	-	2	-	$\Omega$
<b>Dynamic Characteristics</b>						
$C_{ISS}$	Input Capacitance	$V_{GS} = 0V$	-	1390	-	pF
$C_{OSS}$	Output Capacitance	$V_{DS} = 800V$	-	88	-	
$C_{RSS}$	Reverse Transfer Capacitance	$f = 1MHz$	-	6	-	
<b>Switching Characteristics</b>						
$t_{d(ON)}$	Turn-on Delay Time *3	$V_{DD} = 800V$ $V_{GS} = -5/18V$ $I_D = 15A$ $R_G = 5\Omega$	-	11	-	ns
$t_r$	Turn-on Rise Time *3		-	10	-	
$t_{d(OFF)}$	Turn-Off Delay Time *3		-	22	-	
$t_f$	Turn-Off Fall Time *3		-	12	-	
$E_{on}$	Turn-On Energy *3		-	176	-	$\mu J$
$E_{off}$	Turn-Off Energy *3		-	28	-	
$Q_G$	Total Gate-Charge	$V_{DD} = 800V$	-	66	-	nC
$Q_{GS}$	Gate to Source Charge	$V_{GS} = -5/18V$	-	23	-	
$Q_{GD}$	Gate to Drain (Miller) Charge	$I_D = 15A$	-	16	-	
<b>Source-Drain Diode Characteristics</b>						
$V_{SD}$	Diode Forward Voltage *1	$I_{SD} = 15A, V_{GS} = -5V, T_J = 25^\circ\text{C}$	-	4.0	-	V
		$I_{SD} = 15A, V_{GS} = -5V, T_J = 175^\circ\text{C}$	-	3.6	-	
$t_{rr}$	Reverse Recovery Time	$I_F = 15A, V_R = 800V$	-	16	-	ns
$Q_{rr}$	Reverse Recovery Charge	$di/dt = 1000A/\mu s$	-	90	-	nC

Notes:

- The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
- The  $E_{AS}$  data shows Max. rating. The test condition is  $V_{DD} = 120V, V_{GS} = 18V, L = 1mH$
- Guaranteed by design, not subject to production

### Ratings and Characteristics Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

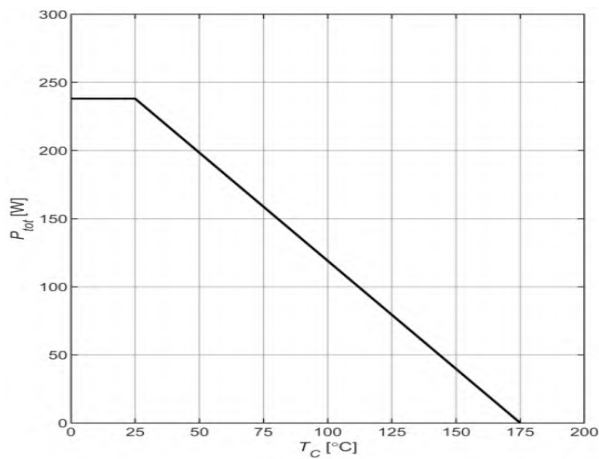


Fig 1 Power Dissipation

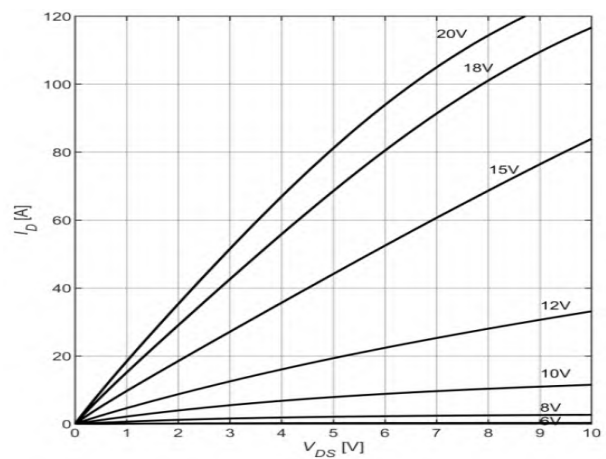


Fig 2 Typical Output Characteristics ( $T_j = -55^\circ\text{C}$ )

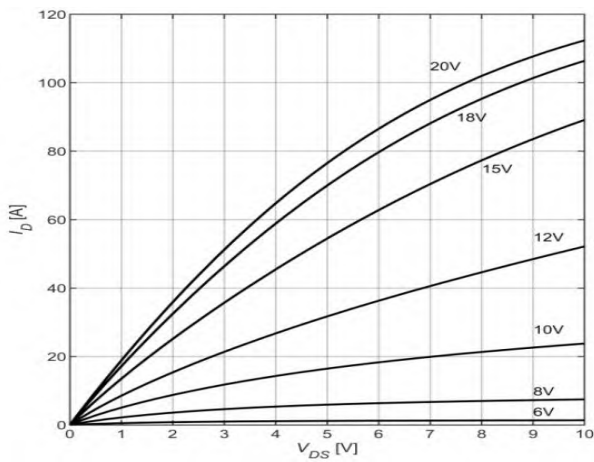


Fig 3 Typical Output Characteristics ( $T_j = 25^\circ\text{C}$ )

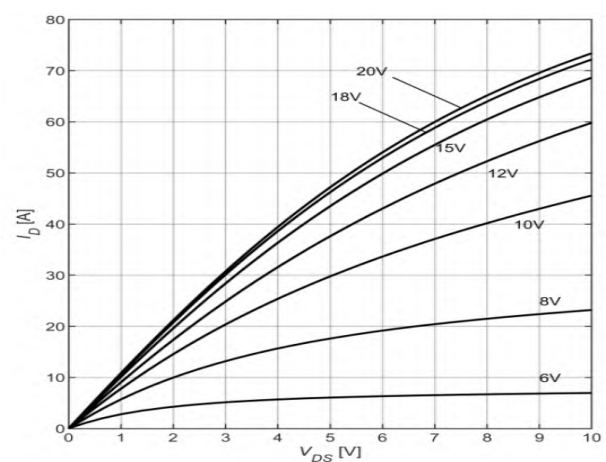


Fig 4 Typical Output Characteristics ( $T_j = 175^\circ\text{C}$ )

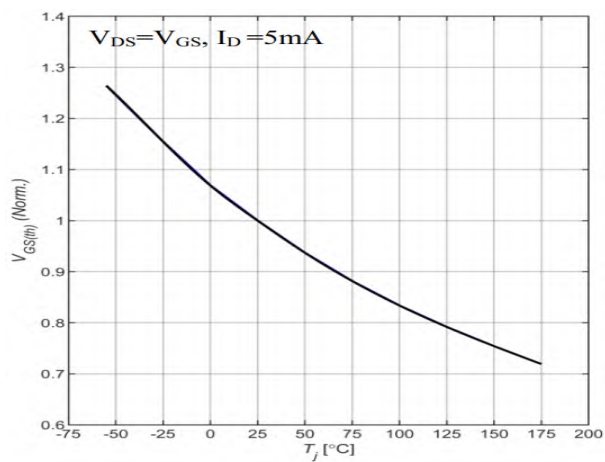


Fig 5 Normalized  $V_{GS(th)}$  vs. Junction Temperature

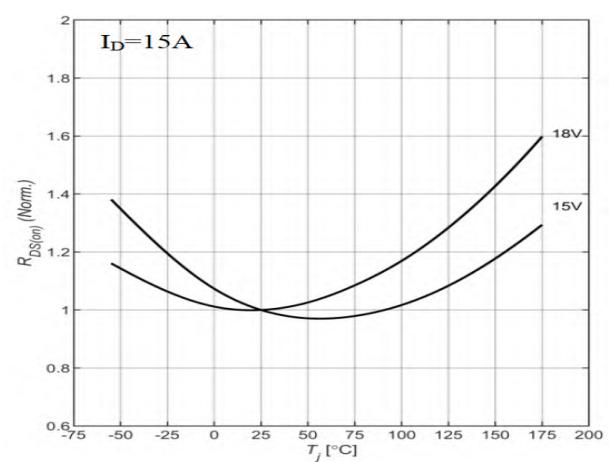


Fig 6 Normalized On-Resistance vs. Junction Temperature

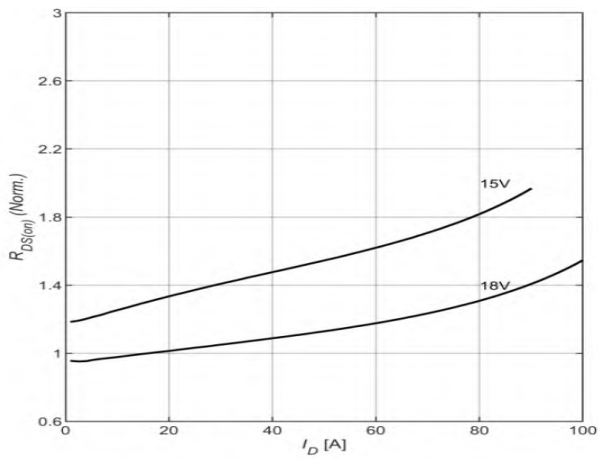


Fig 7 Normalized On-Resistance vs. Drain Current

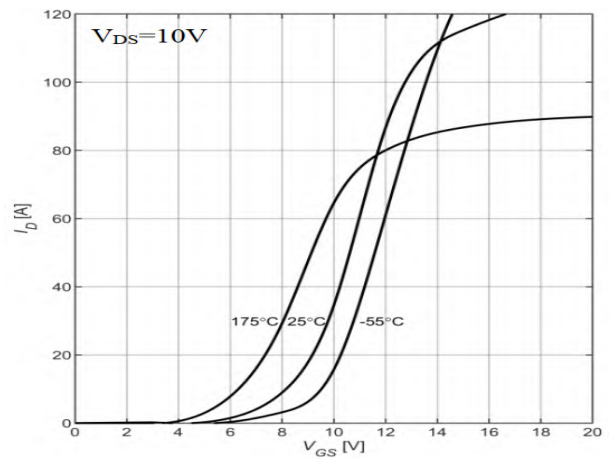


Fig 8 Transfer Characteristics

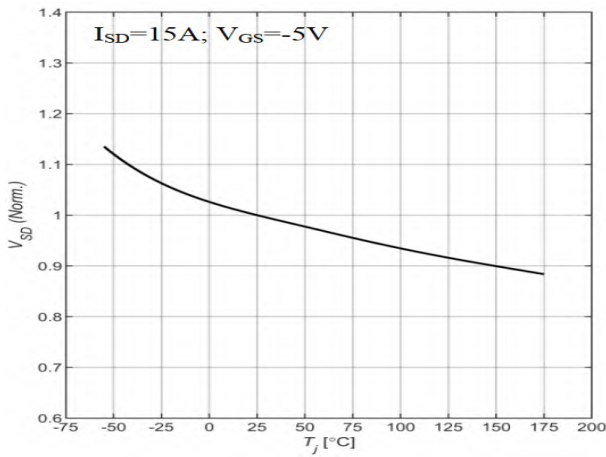


Fig 9 Normalized Diode Forward Voltage vs. Junction Temperature

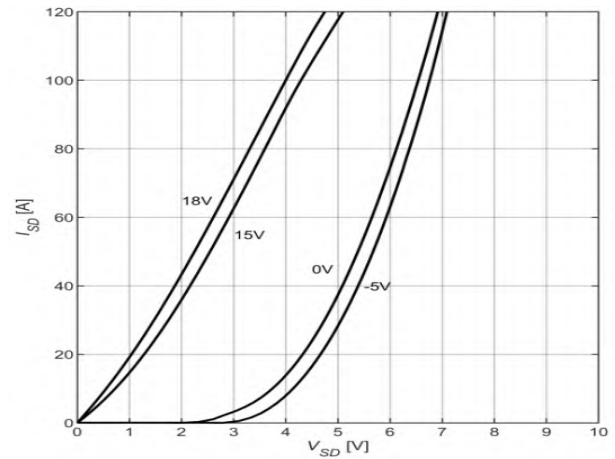


Fig 10 Body-Diode Characteristics ( $T_J = -55°C$ )

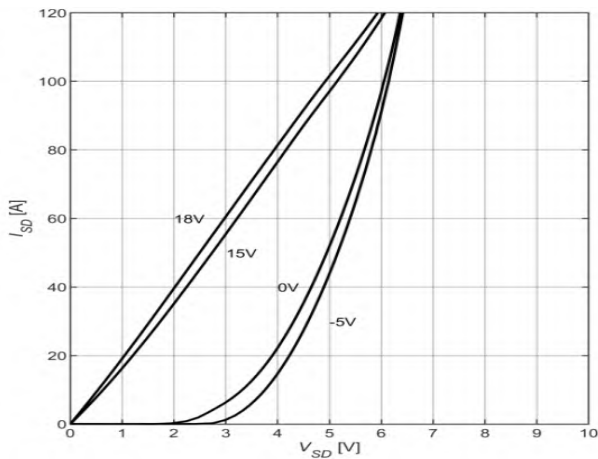


Fig 11 Body-Diode Characteristics ( $T_J = 25°C$ )

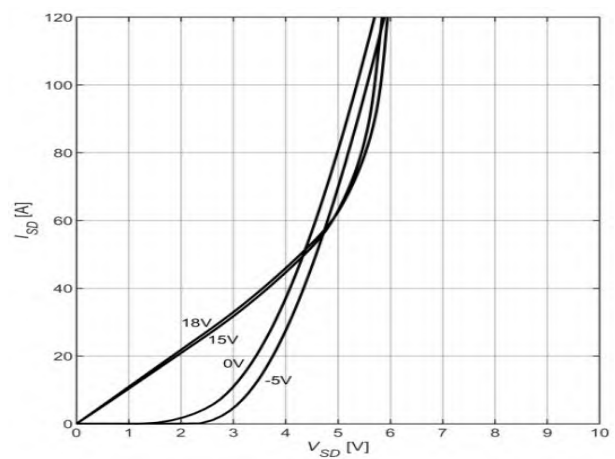
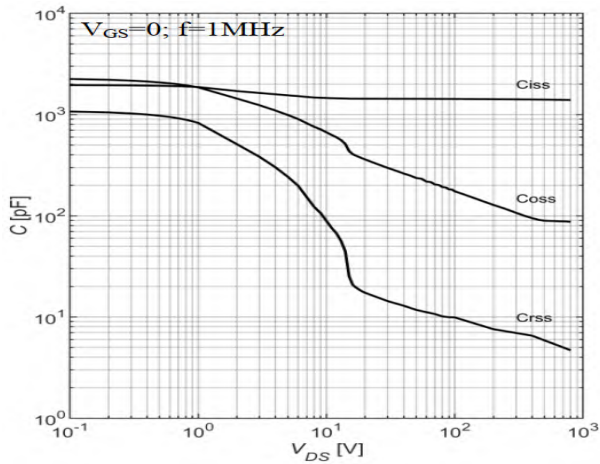
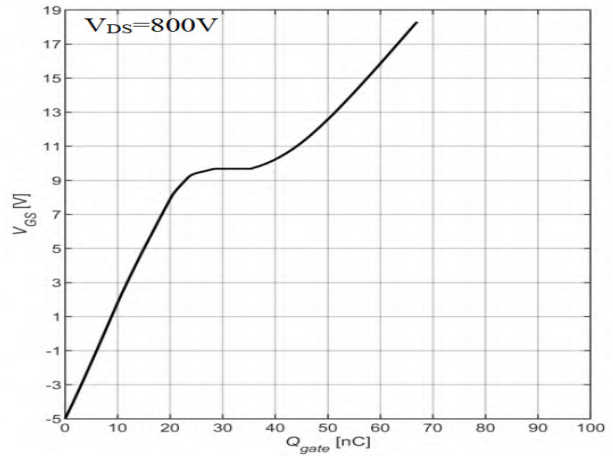


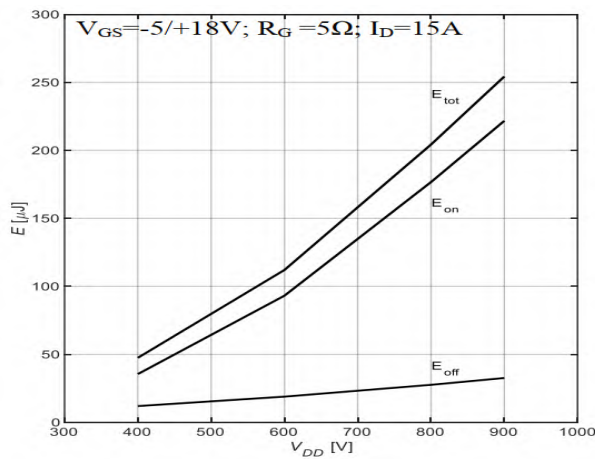
Fig 12 Body-Diode Characteristics ( $T_J = 175°C$ )



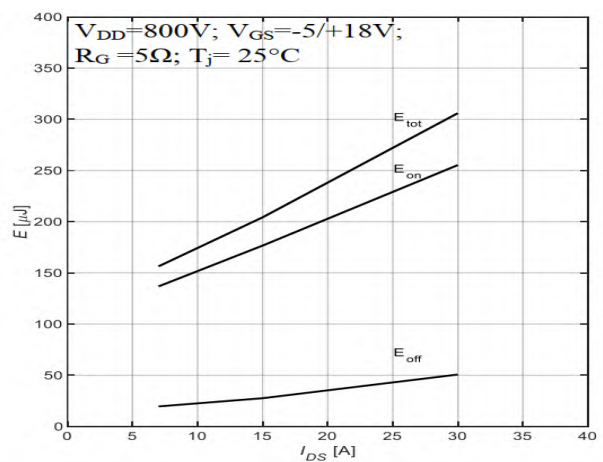
**Fig 13 Capacitance Characteristics**



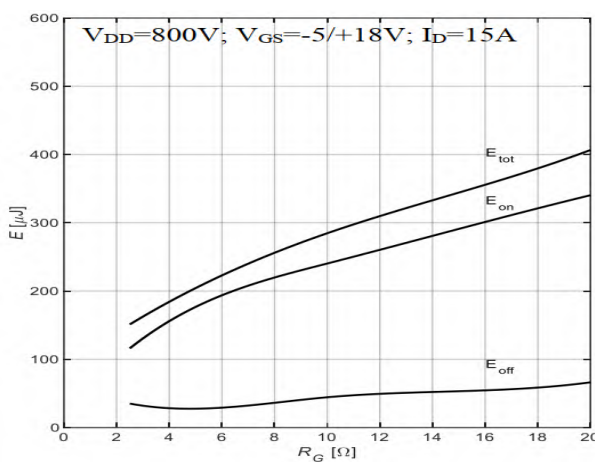
**Fig 14 Gate-Charge Characteristics**



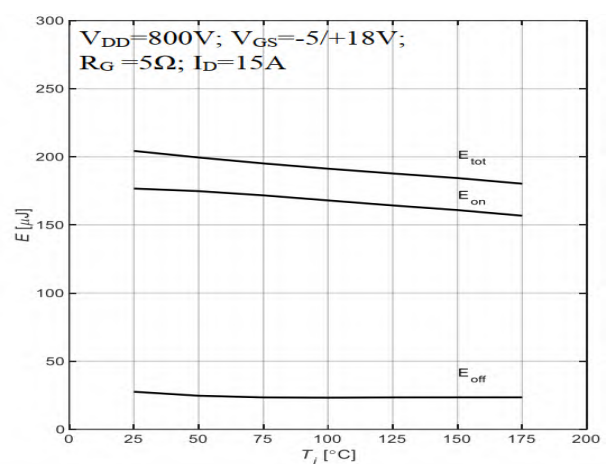
**Fig 15 Output Capacitor Stored Energy**



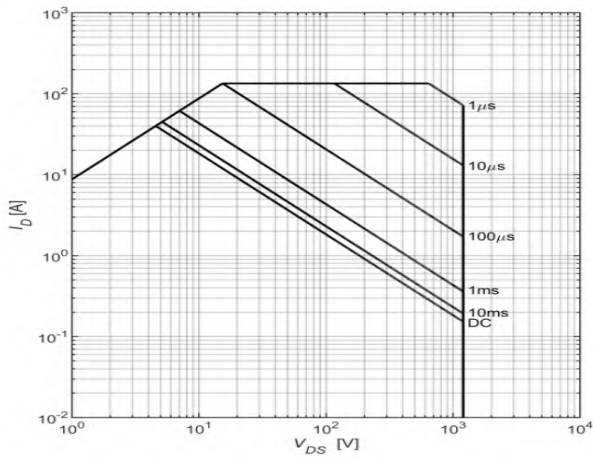
**Fig 16 Clamped Inductive Switching Energy vs. Drain Current**



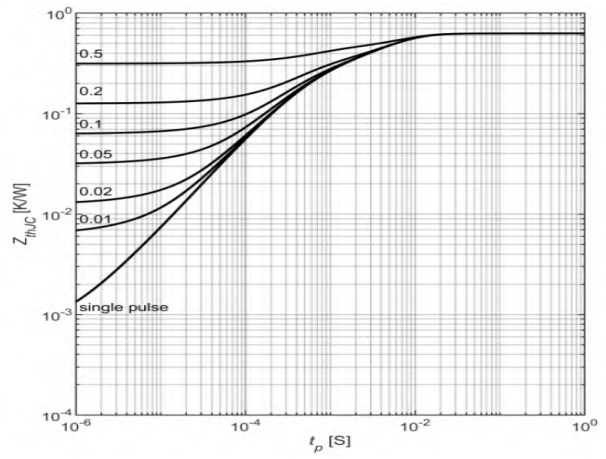
**Fig 17 Clamped Inductive Switching Energy vs.  $R_G$**



**Fig 18 Clamped Inductive Switching Energy vs. Junction Temperature**



**Fig 19 Safe Operating Area**



**Fig 20 Maximum transient thermal impedance**

**Package Outline Dimensions** (Unit: mm)

