

$V_{DSS}$	650V
$R_{DS(on)}$ (Typ.)	60mΩ
$I_D$	39A
$P_D$	165W

### ●Features

- 1) Low on-resistance
- 2) Fast switching speed
- 3) Fast reverse recovery
- 4) Easy to parallel
- 5) Simple to drive
- 6) Pb-free lead plating ; RoHS compliant

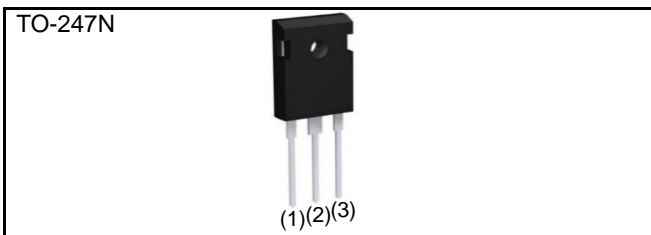
### ●Application

- Solar inverters
- DC/DC converters
- Switch mode power supplies
- Induction heating
- Motor drives

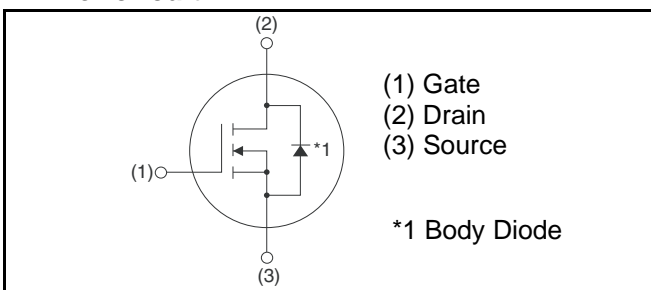
### ●Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Value	Unit	
Drain - Source voltage	$V_{DSS}$	650	V	
Continuous drain current	$T_c = 25^\circ\text{C}$	$I_D^{*1}$	39	A
	$T_c = 100^\circ\text{C}$	$I_D^{*1}$	27	A
Pulsed drain current	$I_{D,pulse}^{*2}$	97	A	
Gate - Source voltage	$V_{GSS}$	-4 to 22	V	
Gate-Source Surge Voltage	$V_{GSS\_surge}$	-4 to 22	V	
Recommended Drive Voltage	$V_{GS\_op}$	0 / 18	V	
Junction temperature	$T_j$	175	$^\circ\text{C}$	
Range of storage temperature	$T_{stg}$	-55 to +175	$^\circ\text{C}$	

### ●Outline



### ●Inner circuit



### ●Packaging specifications

Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Taping code	C11
	Marking	SCT3060AL

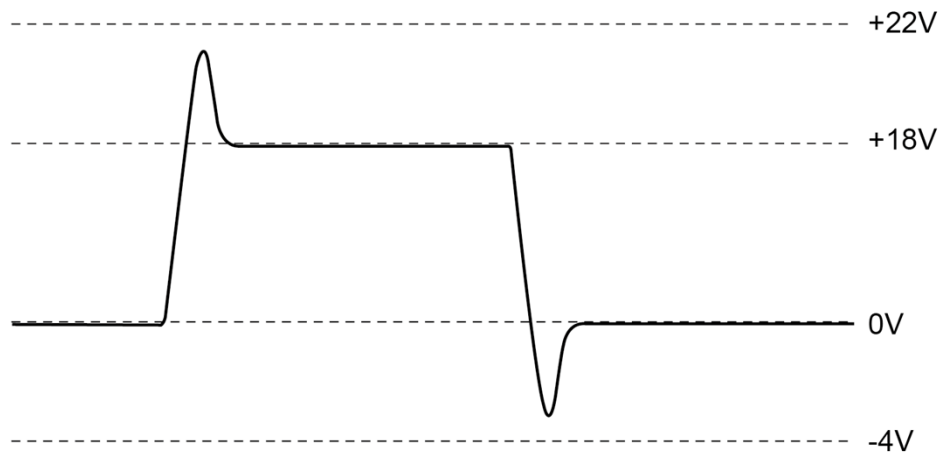
### ●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	$R_{thJC}$	-	0.70	0.91	°C/W

### ●Electrical characteristics ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{V}, I_D = 1\text{mA}$	650	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 650\text{V}, V_{GS} = 0\text{V}$ $T_j = 25^\circ\text{C}$	-	1	10	$\mu\text{A}$
		$T_j = 150^\circ\text{C}$	-	2	-	
Gate - Source leakage current	$I_{GSS+}$	$V_{GS} = +22\text{V}, V_{DS} = 0\text{V}$	-	-	100	nA
Gate - Source leakage current	$I_{GSS-}$	$V_{GS} = -4\text{V}, V_{DS} = 0\text{V}$	-	-	-100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = 10\text{V}, I_D = 6.67\text{mA}$	2.7	-	5.6	V
Static drain - source on - state resistance	$R_{DS(on)}^{*3}$	$V_{GS} = 18\text{V}, I_D = 13\text{A}$ $T_j = 25^\circ\text{C}$	-	60	78	$\text{m}\Omega$
		$T_j = 125^\circ\text{C}$	-	79.2	-	
Gate input resistance	$R_G$	$f = 1\text{MHz}, \text{open drain}$	-	12	-	$\Omega$

### ●Example of acceptable Vgs waveform



**●Electrical characteristics (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	$g_{fs}^{*3}$	V <sub>DS</sub> = 10V, I <sub>D</sub> = 13A	-	4.9	-	S
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0V	-	852	-	pF
Output capacitance	C <sub>oss</sub>	V <sub>DS</sub> = 500V	-	55	-	
Reverse transfer capacitance	C <sub>rss</sub>	f = 1MHz	-	24	-	
Effective output capacitance, energy related	C <sub>o(er)</sub>	V <sub>GS</sub> = 0V V <sub>DS</sub> = 0V to 300V	-	126	-	pF
Turn - on delay time	$t_{d(on)}^{*3}$	V <sub>DD</sub> = 300V, I <sub>D</sub> = 13A	-	19	-	ns
Rise time	$t_r^{*3}$	V <sub>GS</sub> = 18V/0V	-	37	-	
Turn - off delay time	$t_{d(off)}^{*3}$	R <sub>L</sub> = 23Ω	-	34	-	
Fall time	$t_f^{*3}$	R <sub>G</sub> = 0Ω	-	21	-	
Turn - on switching loss	E <sub>on</sub> <sup>*3</sup>	V <sub>DD</sub> = 300V, I <sub>D</sub> =13A V <sub>GS</sub> = 18V/0V	-	70	-	μJ
Turn - off switching loss	E <sub>off</sub> <sup>*3</sup>	R <sub>G</sub> = 0Ω L=500μH *E <sub>on</sub> includes diode reverse recovery	-	10	-	

**●Gate Charge characteristics (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	$Q_g^{*3}$	V <sub>DD</sub> = 300V	-	58	-	nC
Gate - Source charge	$Q_{gs}^{*3}$	I <sub>D</sub> = 13A	-	15	-	
Gate - Drain charge	$Q_{gd}^{*3}$	V <sub>GS</sub> = 18V	-	23	-	
Gate plateau voltage	V <sub>(plateau)</sub>	V <sub>DD</sub> = 300V, I <sub>D</sub> = 13A	-	9.6	-	V

\*1 Limited only by maximum temperature allowed.

\*2 PW ≤ 10μs, Duty cycle ≤ 1%

\*3 Pulsed

**●Body diode electrical characteristics (Source-Drain) ( $T_a = 25^\circ\text{C}$ )**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	$I_S^{*1}$	$T_c = 25^\circ\text{C}$	-	-	39	A
Inverse diode direct current, pulsed	$I_{SM}^{*2}$		-	-	97	A
Forward voltage	$V_{SD}^{*3}$	$V_{GS} = 0\text{V}, I_S = 13\text{A}$	-	3.2	-	V
Reverse recovery time	$t_{rr}^{*3}$	$I_F = 13\text{A}, V_R = 300\text{V}$ $di/dt = 1100\text{A}/\mu\text{s}$	-	15	-	ns
Reverse recovery charge	$Q_{rr}^{*3}$		-	55	-	nC
Peak reverse recovery current	$I_{rrm}^{*3}$		-	8	-	A

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

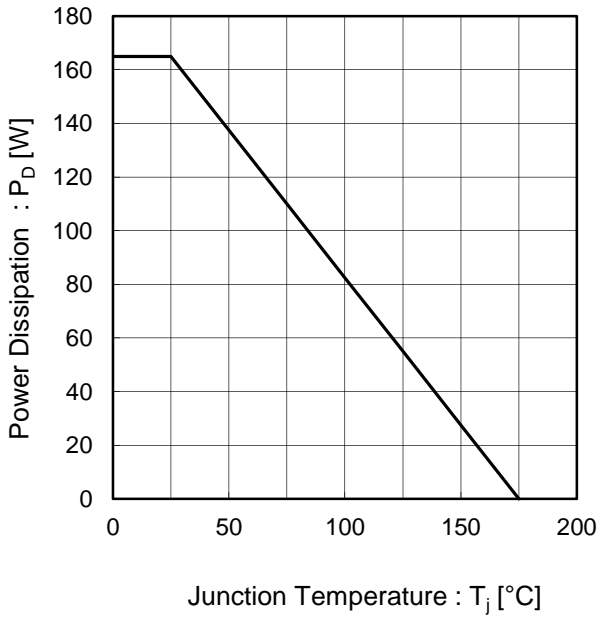


Fig.2 Maximum Safe Operating Area

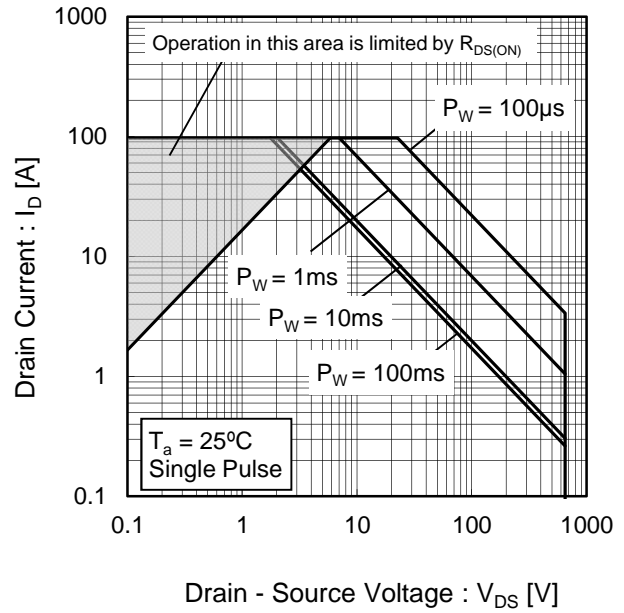
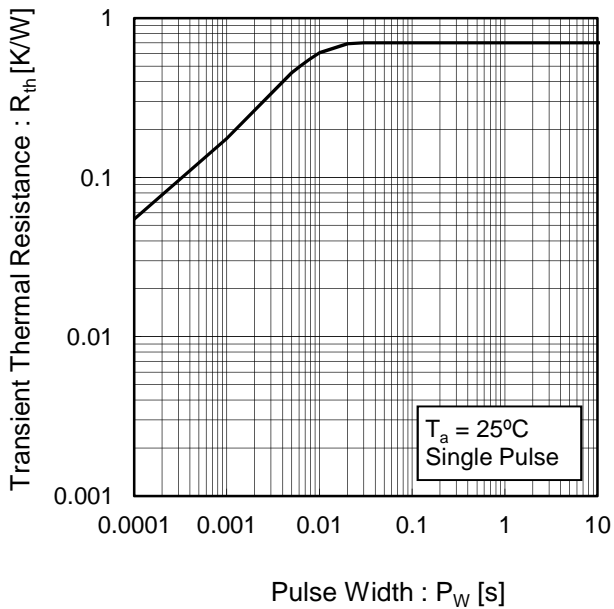


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

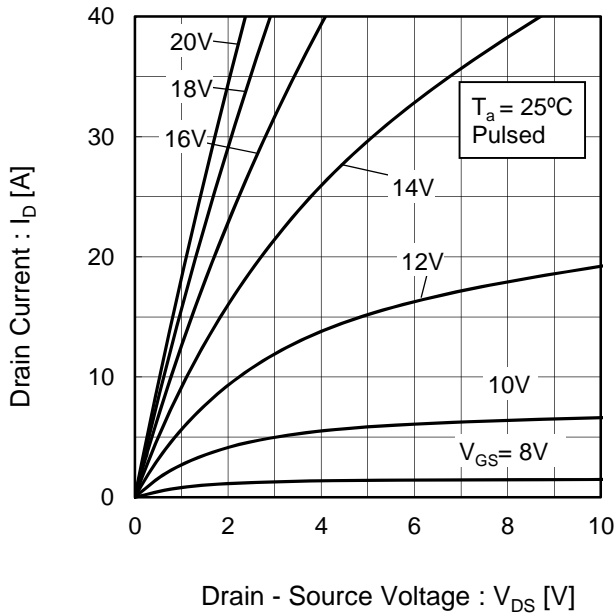


Fig.5 Typical Output Characteristics(II)

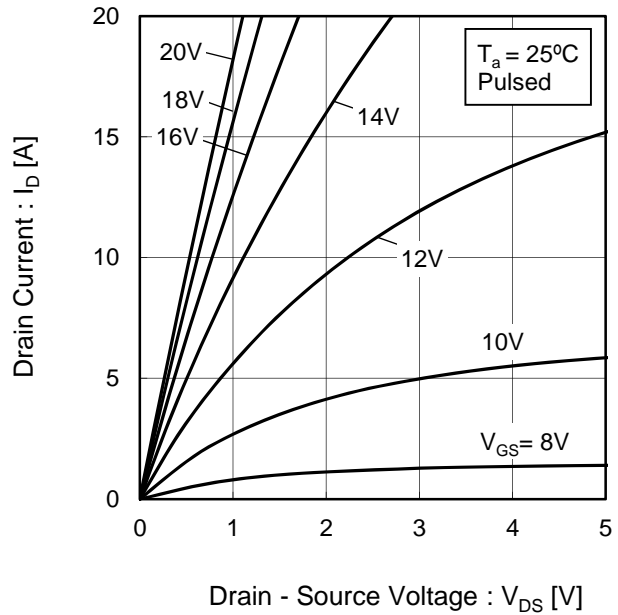


Fig.6  $T_j = 150^\circ\text{C}$  Typical Output Characteristics(I)

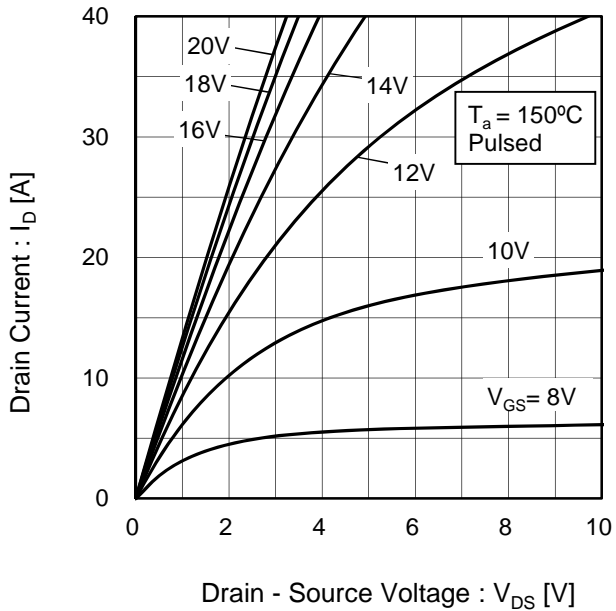
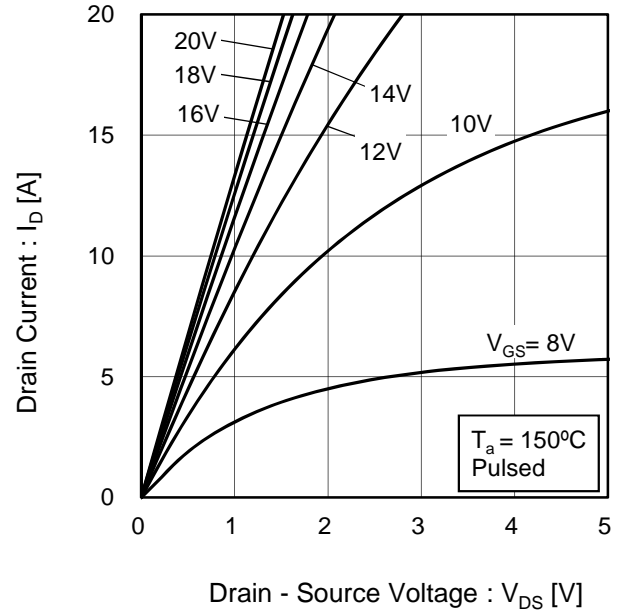


Fig.7  $T_j = 150^\circ\text{C}$  Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics (I)

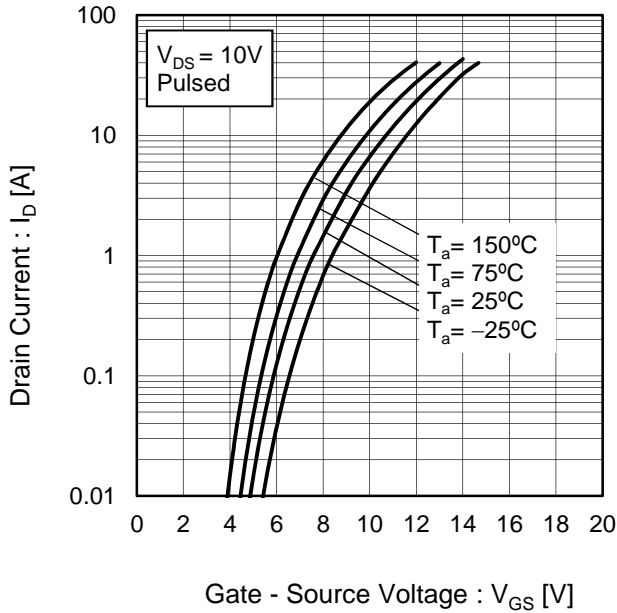


Fig.9 Typical Transfer Characteristics (II)

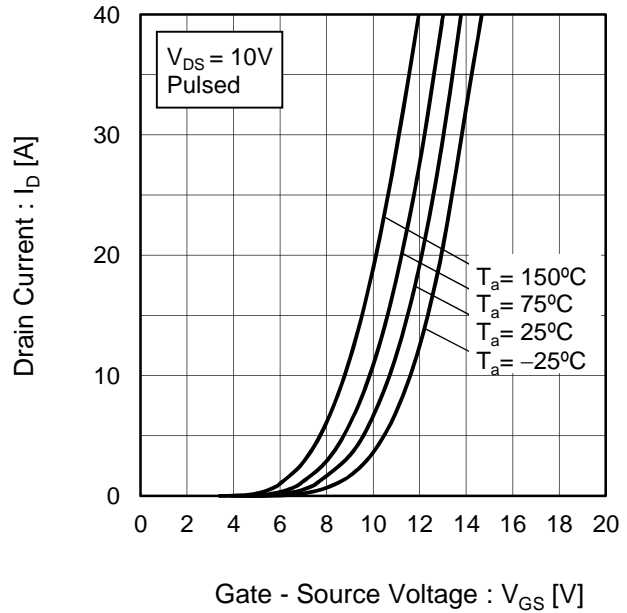


Fig.10 Gate Threshold Voltage vs. Junction Temperature

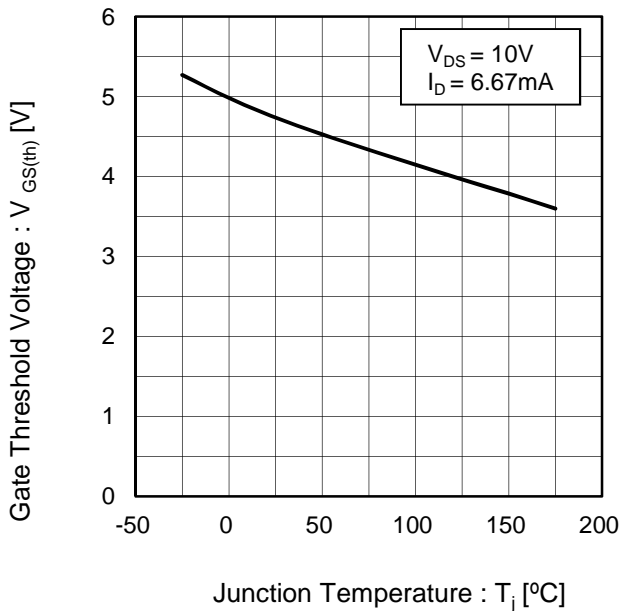
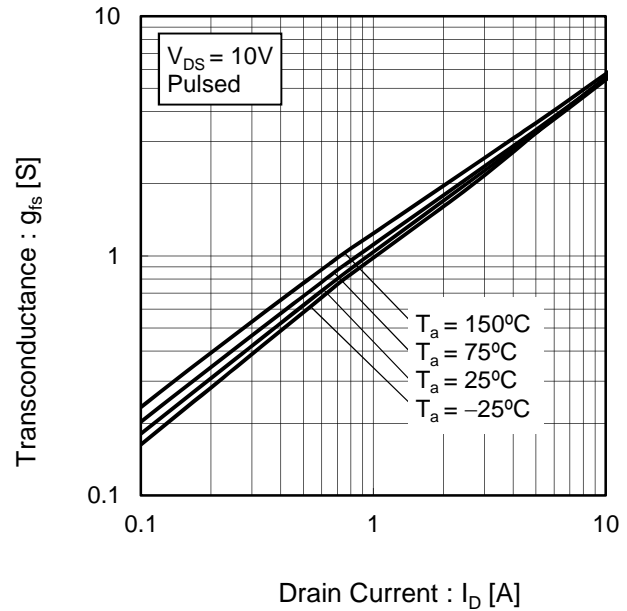


Fig.11 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.12 Static Drain - Source On - State Resistance vs. Gate - Source Voltage

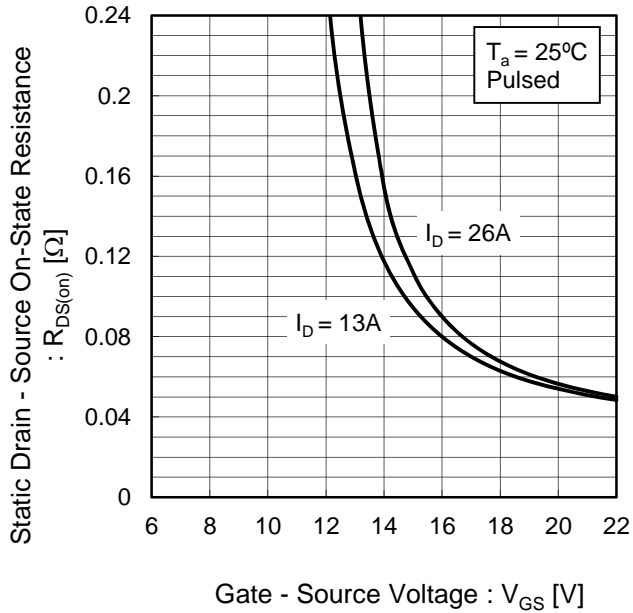


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature

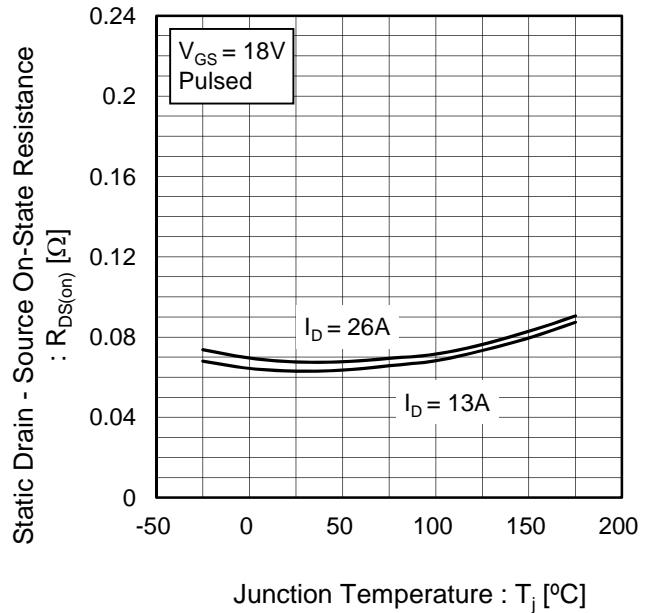
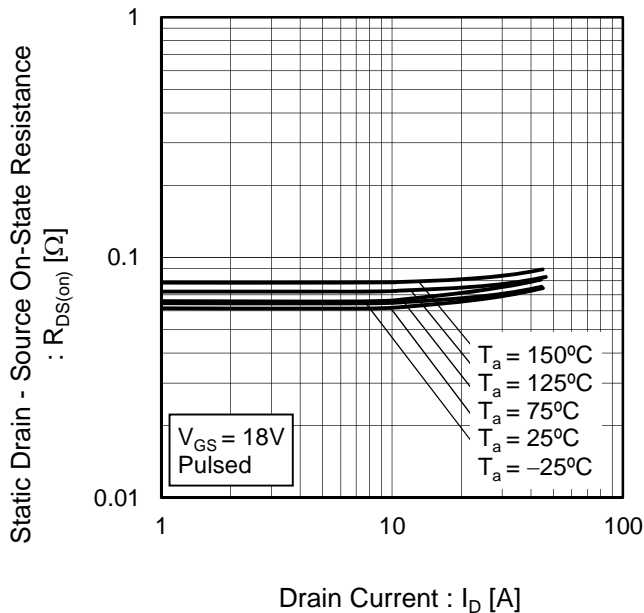


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.15 Typical Capacitance vs. Drain - Source Voltage

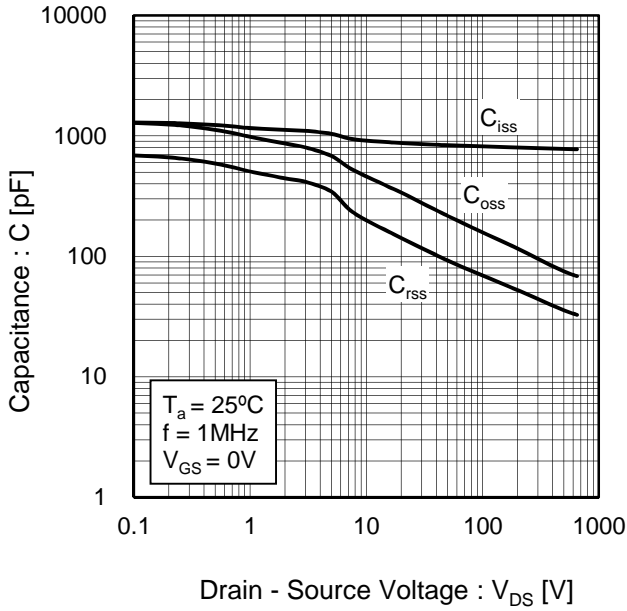


Fig.16 Coss Stored Energy

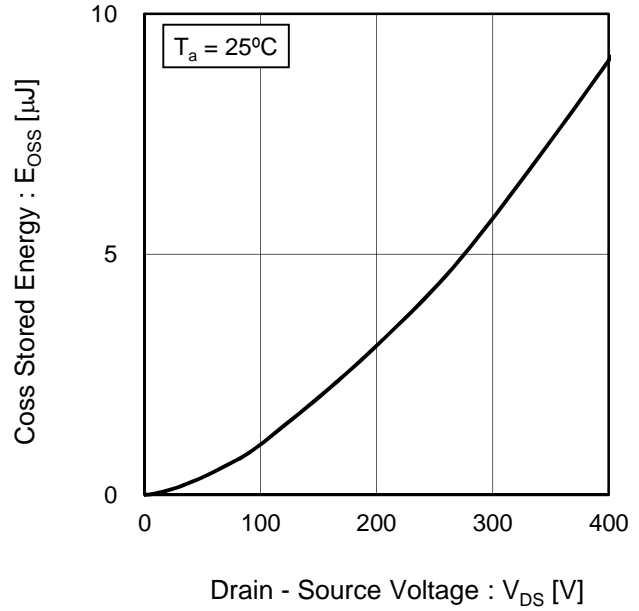


Fig.17 Switching Characteristics

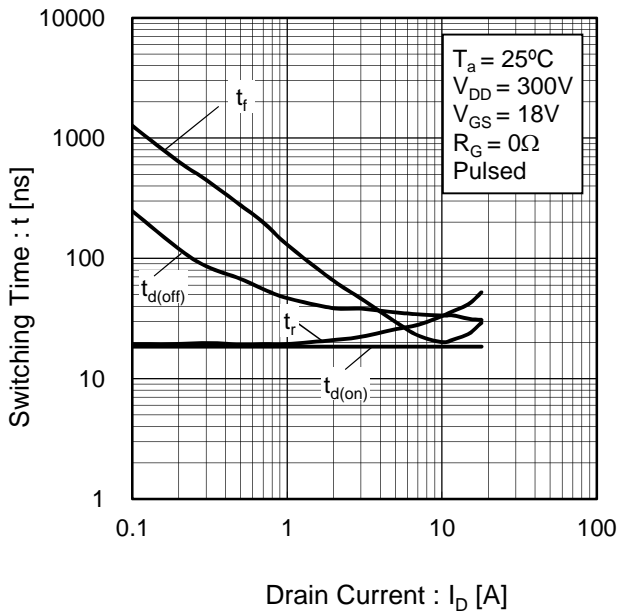
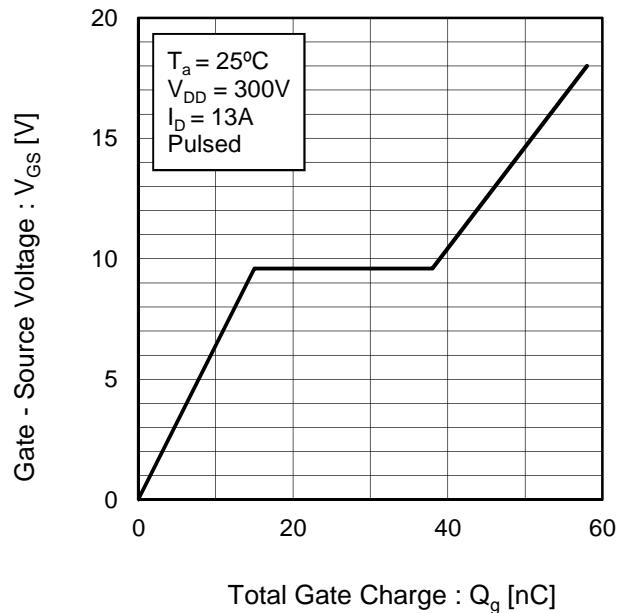


Fig.18 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.19 Typical Switching Loss vs. Drain - Source Voltage

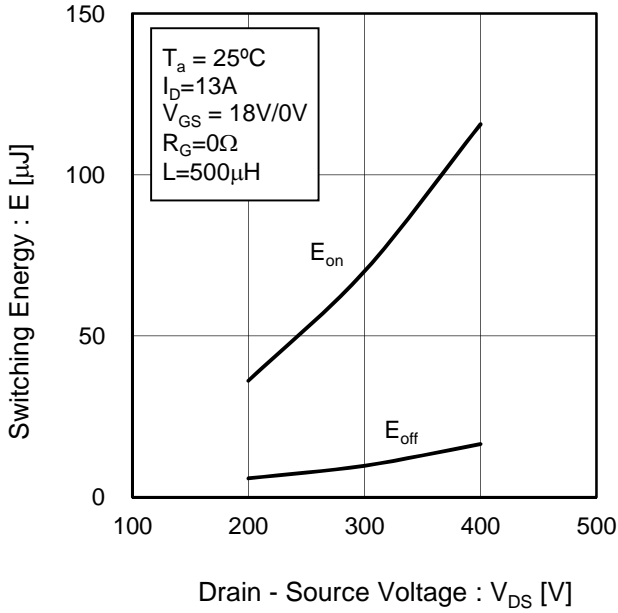


Fig.20 Typical Switching Loss vs. Drain Current

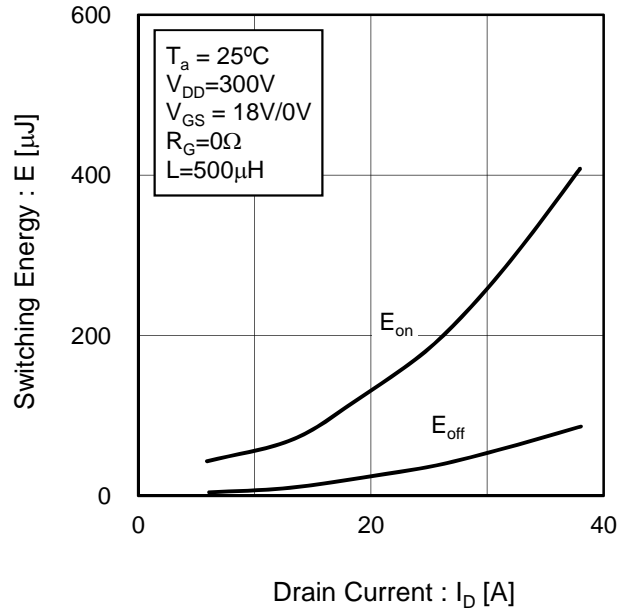
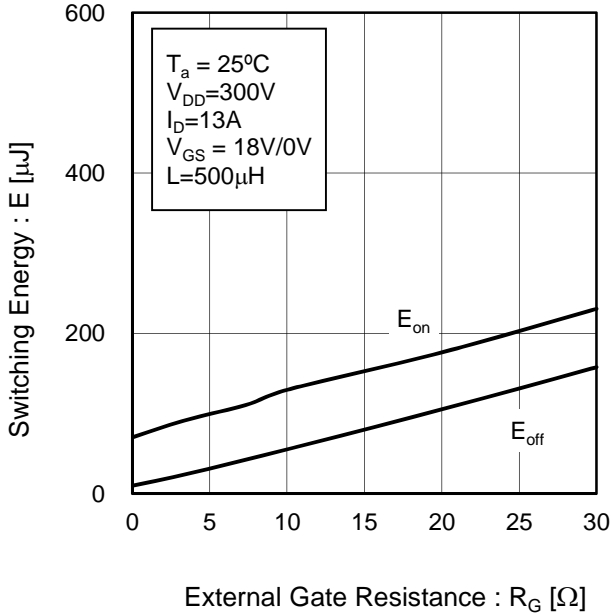


Fig.21 Typical Switching Loss vs. External Gate Resistance



●Electrical characteristic curves

Fig.22 Inverse Diode Forward Current vs. Source - Drain Voltage

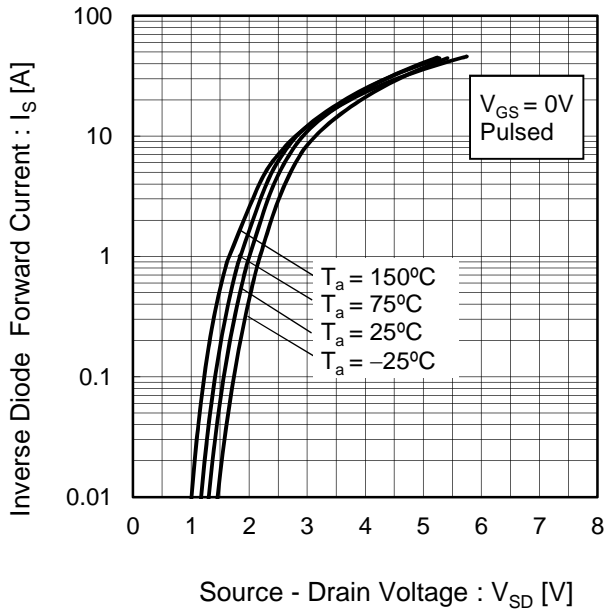
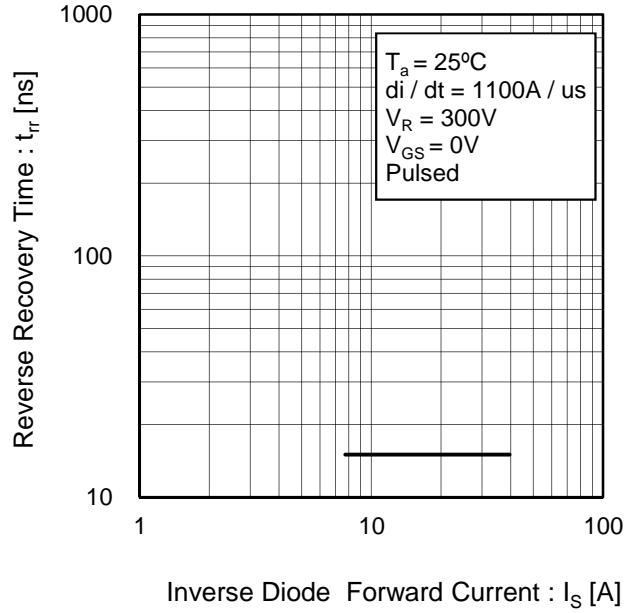


Fig.23 Reverse Recovery Time vs. Inverse Diode Forward Current



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

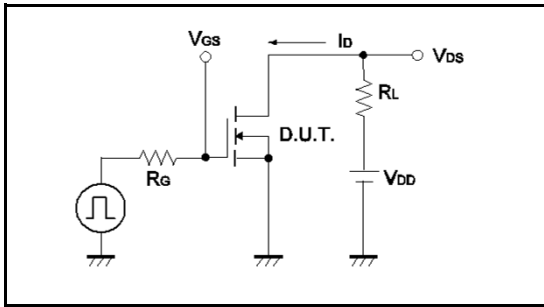


Fig.1-2 Switching Waveforms

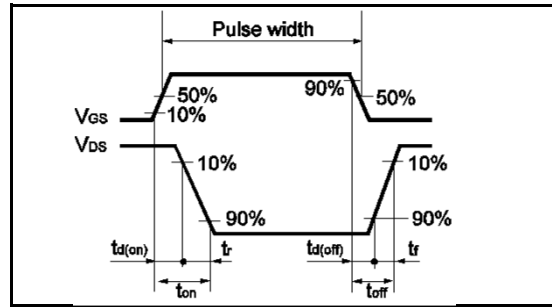


Fig.2-1 Gate Charge Measurement Circuit

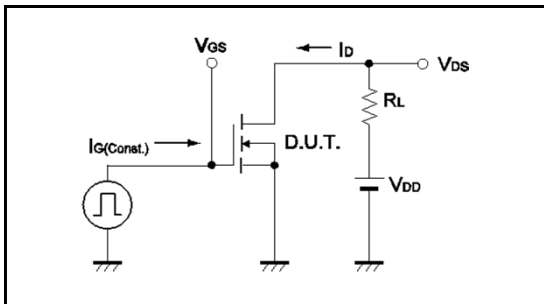


Fig.2-2 Gate Charge Waveform

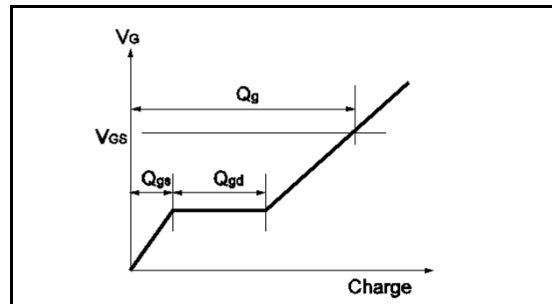


Fig.3-1 Switching Energy Measurement Circuit

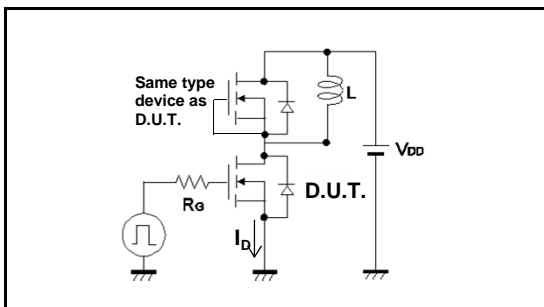


Fig.3-2 Switching Waveforms

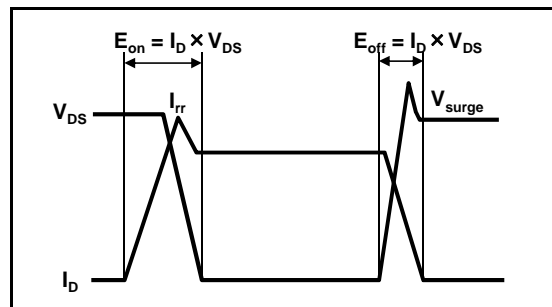


Fig.4-1 Reverse Recovery Time Measurement Circuit

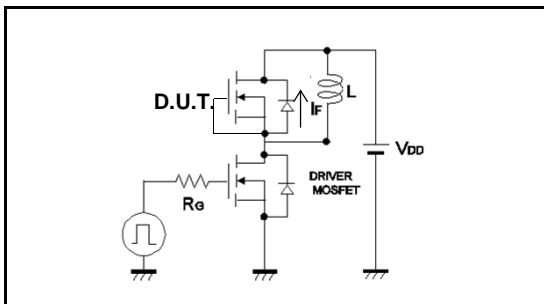
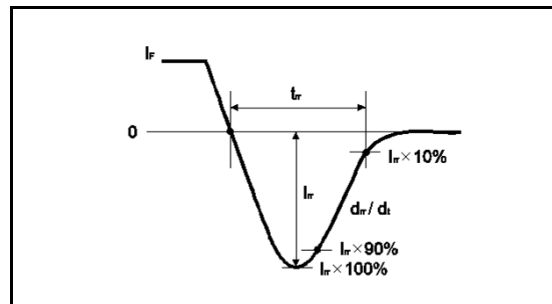


Fig.4-2 Reverse Recovery Waveform



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Part Number	SCT3060AL
Package	TO-247N
Unit Quantity	450
Minimum Package Quantity	30
Packing Type	Tube
Constitution Materials List	inquiry
RoHS	Yes