

N-Channel Enhancement Mode Field Effect Transistor

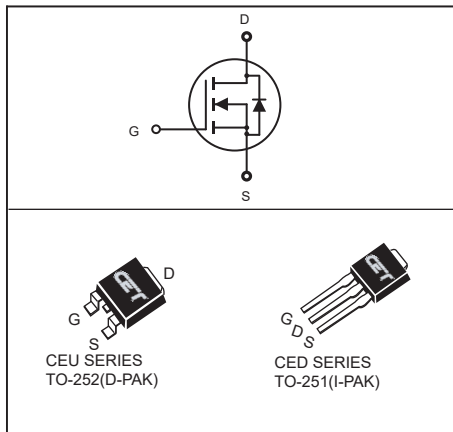
FEATURES

- High power and current handing capability.
- Reliable and rugged.
- Pb-free lead plating ; RoHS compliant.
- Halogen Free.
- 100% Avalanche tested .

APPLICATIONS

- BLDC motor drive applications.
- DC-DC Converters.
- Load Switch.

V_{DS}	$R_{DS(ON)}$ typ @ V_{GS}	I_D
40V	4m Ω @ $V_{GS} = 10V$	78A



ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Limit	Units
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous @ $T_C = 25^\circ\text{C}$	I_D	78	A
@ $T_C = 70^\circ\text{C}$		66	A
Drain Current-Pulsed ^a	I_{DM}	312	A
Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	P_D	55	W
- Derate above 25°C		0.37	W/ $^\circ\text{C}$
Single Pulsed Avalanche Energy ^d	E_{AS}	200	mJ
Single Pulsed Avalanche Current ^d	I_{AS}	20	A
Operating and Store Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.7	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	$^\circ\text{C/W}$

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	40			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40V, V_{GS} = 0V$			1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	$V_{GS} = 20V, V_{DS} = 0V$			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	$V_{GS} = -20V, V_{DS} = 0V$			-100	nA
On Characteristics ^b						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1		3	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 30A$		4	5	m Ω
		$V_{GS} = 4.5V, I_D = 20A$		5.6	7	m Ω
Gate Input Resistance	R_g	f=1MHz,open Drain		1.3		Ω
Dynamic Characteristics ^c						
Input Capacitance	C_{iss}	$V_{DS} = 15V, V_{GS} = 0V,$ f = 1.0 MHz		3910		pF
Output Capacitance	C_{oss}			340		pF
Reverse Transfer Capacitance	C_{rss}			300		pF
Switching Characteristics ^c						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15V, I_D = 1A,$ $V_{GS} = 10V, R_{GEN} = 6\Omega$		22		ns
Turn-On Rise Time	t_r			9		ns
Turn-Off Delay Time	$t_{d(off)}$			87		ns
Turn-Off Fall Time	t_f			19		ns
Total Gate Charge	Q_g	$V_{DS} = 15V, I_D = 16A,$ $V_{GS} = 4.5V$		30		nC
Gate-Source Charge	Q_{gs}			7		nC
Gate-Drain Charge	Q_{gd}			15		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Current-Continuous	I_S				65	A
Drain-Source Diode Current-Pulsed ^b	I_{SM}				312	A
Drain-Source Diode Forward Voltage ^b	V_{SD}	$V_{GS} = 0V, I_S = 20A$			1.2	V
Notes :						
a.Repetitive Rating : Pulse width limited by maximum junction temperature.						
b.Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.						
c.Guaranteed by design, not subject to production testing.						
d.L = 1mH, $I_{AS} = 20A, V_{DD} = 24V, R_G = 25\Omega$, Starting $T_J = 25^{\circ}C$.						

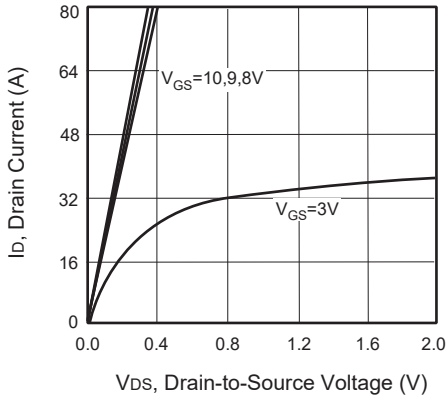


Figure 1. Output Characteristics

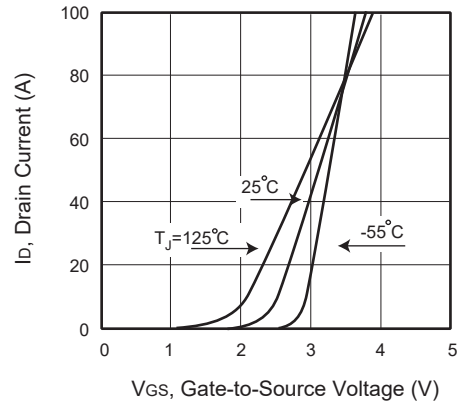


Figure 2. Transfer Characteristics

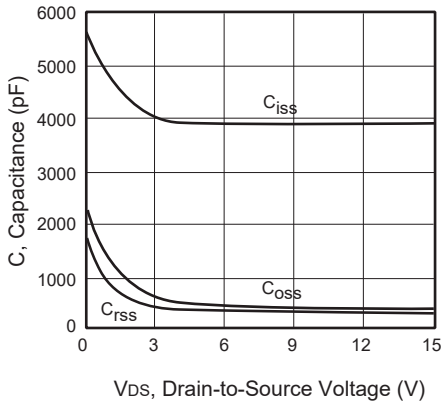


Figure 3. Capacitance

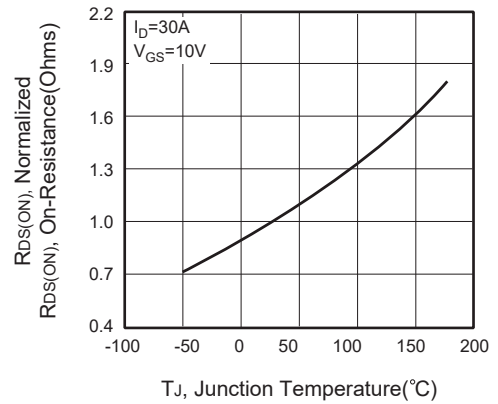


Figure 4. On-Resistance Variation with Temperature

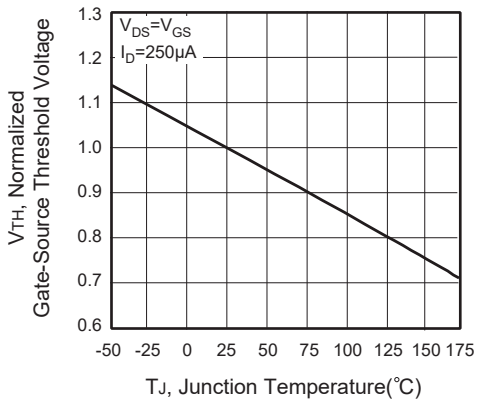


Figure 5. Gate Threshold Variation with Temperature

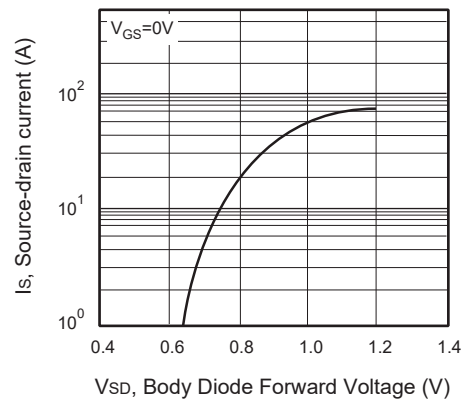


Figure 6. Body Diode Forward Voltage Variation with Source Current

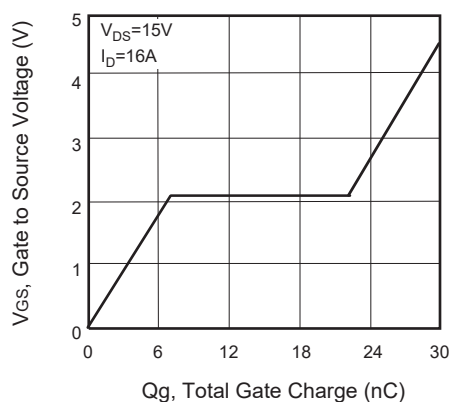


Figure 7. Gate Charge

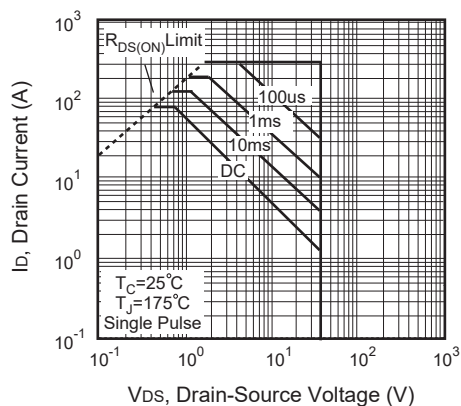


Figure 8. Maximum Safe Operating Area

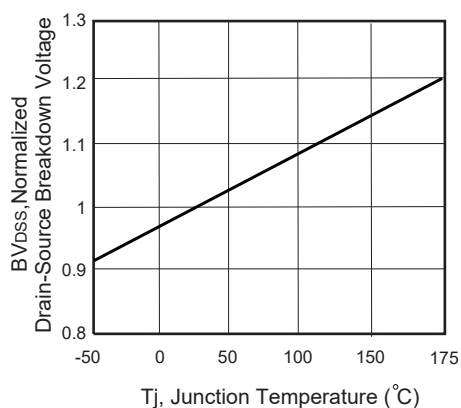


Figure 9. Breakdown Voltage Variation VS Temperature

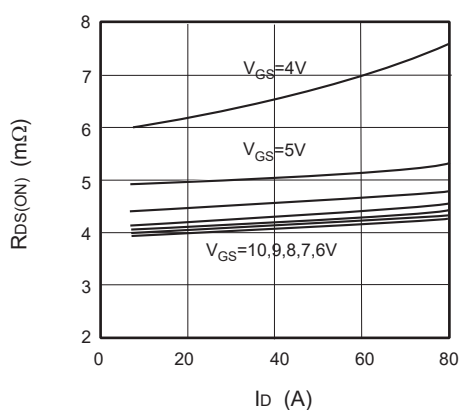


Figure 10. On-Resistance VS Drain Current

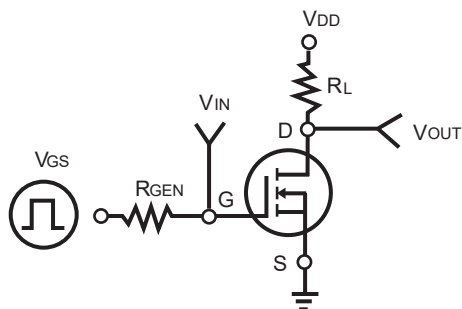


Figure 11. Switching Test Circuit

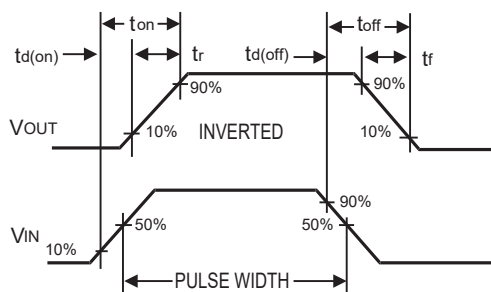


Figure 12. Switching Waveforms

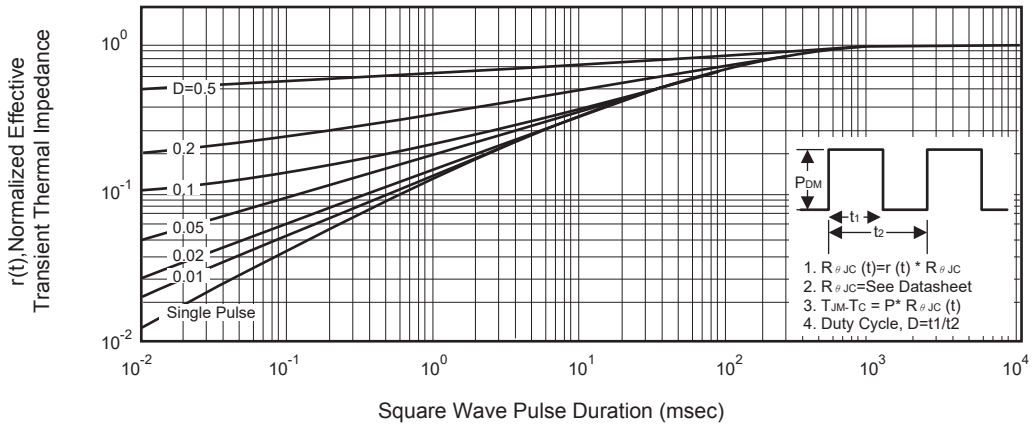


Figure 13. Normalized Thermal Transient Impedance Curve